

**DRAFT  
ENVIRONMENTAL SURVEY  
PROPERTY ADJACENT TO OCEANA SALVAGE YARD  
NAVAL AIR STATION OCEANA  
VIRGINIA BEACH, VIRGINIA**



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(LANTNAVFACENGCOM)  
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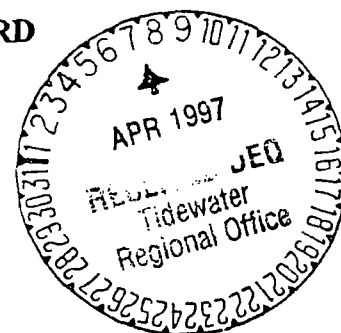
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**ABB-ES PROJECT NUMBER: 07739.00**

**Contract No. N62470-95-D-6001  
DELIVERY ORDER 005**

**JANUARY 1997**

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H-	ANALYTICAL DATA	

*include actual laboratory data sheets*

## **1.0 EXECUTIVE SUMMARY**

Naval Facilities Engineering Command, Atlantic Division (LANTNAVFACENGCOM) contracted ABB Environmental Services, Inc. (ABB-ES) to conduct an Environmental Survey of a parcel of government property that adjoins Oceana Salvage Yard. The Subject Property is part of Naval Air Station (NAS) Oceana in Virginia Beach, Virginia. The Navy has identified potential releases of oil or hazardous materials on the Navy-owned land adjacent to the Oceana Salvage Yard. The salvage yard has operated at this location for approximately 40 years. The salvage yard property shares a common boundary with NAS Oceana, and the Navy leases an unpaved access roadway to Oceana Salvage that connects the salvage yard to Oceana Boulevard. The focus of this Environmental Survey is an area approximately 1,600 feet long by 50 feet wide along the common boundary with Oceana Salvage Yard, plus the access road and bordering areas, where salvage operations are most likely to have encroached on Navy property.

The objectives of the Environmental Survey are 1) to establish a comparative baseline of environmental conditions in the event of future unauthorized disposal on Navy property by Oceana Salvage or others; 2) to reduce Navy liability in future property transactions; and 3) to determine if environmental conditions exist that require reporting to regulatory agencies under existing environmental regulations or consent orders.

This Environmental Survey was conducted consistent with the ASTM Standards for Phase I Environmental Site Assessments (ASTM E 1527-94), and project plans prepared in accordance with a Scope of Work for Environmental Survey, Property Adjacent to Oceana Salvage Yard, NAS Oceana, Virginia Beach, Virginia, dated 28 August 1996 under the terms of Contract Number N62470-95-D-6001, Delivery Order 005.

The Subject Property consists of approximately 3.3 acres of densely wooded wetland, with a water-filled earthen ditch occupying approximately 1,000 linear feet of the common property boundary with the salvage yard. A VEPCO utility right-of-way crosses the northeastern corner of the Subject Property. There are currently no man-made structures located on the Subject Property and based on review of aerial photographs, no structures have existed historically. There are currently no utility services to the Subject Property.

### **FINDINGS**

Based on information derived from records reviews, visual site inspection, and the results of soil sampling and analysis, ABB-ES has identified recognized environmental conditions (i.e., releases or potential releases of oil or hazardous materials) at the Subject Property.

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Recognized environmental conditions include the following:

- There is visual evidence of encroachment onto Navy property by salvage yard operations. Encroachment is in the form of parked vehicles, a small smelter unit, a large boiler, and multiple accumulations of miscellaneous debris including scrap metal, rubber, glass, wood, white goods, furniture, tires, crushed battery casings, and other vehicle parts. Salvage yard operators have also excavated a drainage channel along the common boundary with Navy property. Debris was also observed in the drainage channel.
- Virginia Department of Environmental Quality has been pursuing response actions at Oceana Salvage since 1992. The most significant action to date has been the removal of crushed battery casings and lead-contaminated soil from a small area of Navy property. The soil is currently being remediated using chemical stabilization techniques. *ABB-ES*
- According to salvage yard personnel, a large volume of crushed battery casings were brought to the salvage yard in the 1960s and used as fill material and road base. Despite the removal action conducted by Oceana Salvage, there is visual evidence of additional accumulations of battery casings along the south side of the access road and in the vicinity of the remedial action conducted by Oceana Salvage.
- Results of soil sampling and analysis from both biased and unbiased locations across the Subject Property indicate that concentrations of lead, PCBs, and semivolatile PAHs exceed background and USEPA screening values for non-residential sites. No surface water or groundwater samples were collected as part of this investigation.

## CONCLUSIONS

- 1) Contamination of surface soil at the Subject Property has resulted from salvage yard operations, and potentially from waste disposal activities by others. Contaminants of concern are lead, PCBs, and PAHs. Evidence of petroleum-related contamination was also noted.
- 2) The areas of concern (based on the presence of contaminants in surface soil at concentrations exceeding screening values) appear to be concentrated near the entrance to the salvage yard and the vicinity of crushed battery casings.
- 3) Both excavation and filling activities have occurred in classified non-tidal wetland areas at the Subject Property over a period of time.

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- 4) The potential exists for impact to surface water, sediment, and shallow groundwater from waste disposal activities at the Subject Property and adjoining properties.

RECOMMENDATIONS

- 1) Continue removal of remaining debris accumulations on Navy property to eliminate potential for future impact to the wetlands.
- 2) Consult with NAS Oceana legal counsel regarding notification of VDEQ of the findings of this investigation, either under the current RCRA Consent Order or under Clean Water Act reporting requirements.
- 3) Continue to monitor the progress and results of environmental remediation activities at Oceana Salvage Yard.
- 4) Evaluate the nature of potential contamination in groundwater, surface water, and sediment at the Subject Property by conducting Phase II sampling and analysis activities.
- 5) Based on the expressed concern of VDEQ regarding the remediation of crushed battery casings, make a qualitative evaluation of the extent of crushed casings present along the south side of the access road and near the ponded area.

space

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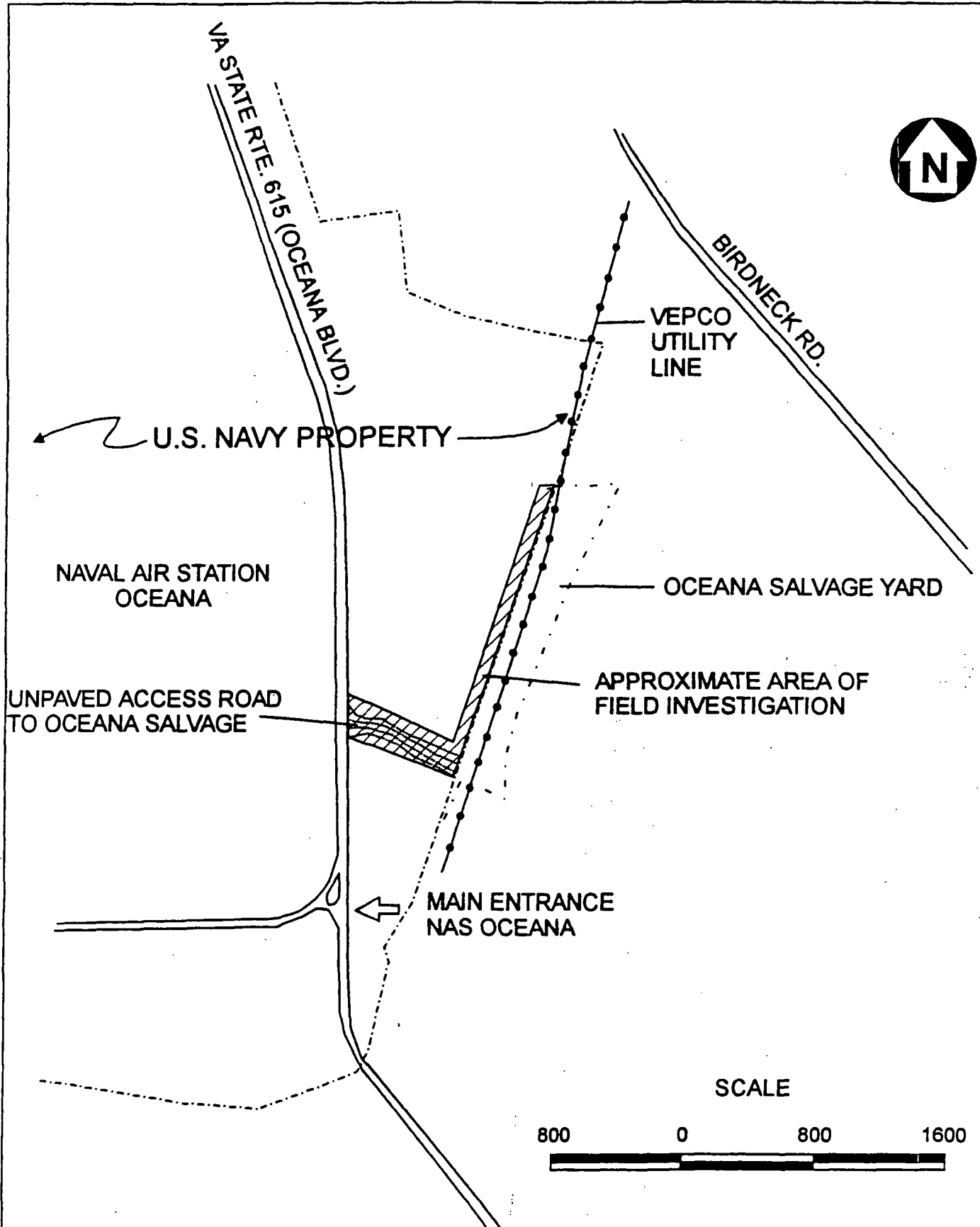


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**FIGURE 2-1**  
**AREA OF INVESTIGATION**  
**PROPERTY ADJACENT TO OCEANA SALVAGE**  
**NAS OCEANA**  
**VIRGINIA BEACH, VA**

AR100025

## **2.0 INTRODUCTION**

Naval Facilities Engineering Command, Atlantic Division (LANTNAVFACENGCOM) contracted ABB Environmental Services, Inc. (ABB-ES) to conduct an Environmental Survey (ES) of Navy-owned property adjacent to Oceana Salvage Yard at Naval Air Station (NAS) Oceana in Virginia Beach, Virginia. The Navy has identified potential releases of oil or hazardous materials on Navy-owned land (hereinafter, the Subject Property), adjacent to the Oceana Salvage Yard. The salvage yard is a privately-owned business located at 1040 South Oceana Boulevard (VA State Route 615). The property shares a common boundary with NAS Oceana, and the Navy leases an unpaved access roadway to Oceana Salvage that connects the salvage yard to Oceana Boulevard (Figure 2-1). The focus of this ES is an area approximately 1,600 feet long by 50 feet wide along the common boundary with Oceana Salvage Yard, plus the access road and bordering areas, where salvage operations are most likely to have encroached on Navy property.

### **2.1 OBJECTIVES**

Under existing environmental regulations, the Navy could be held responsible for remedial action related to hazardous or toxic wastes or substances left by other parties on Navy-owned property. In order to protect the interest of the Navy, it is imperative that the Navy establish and document the environmental conditions that currently exist on the Subject Property. The objectives of the ES are:

- to establish a comparative baseline of environmental conditions in the event of future unauthorized disposal on Navy property by Oceana Salvage or others;
- to reduce Navy liability in future property transactions; and
- to determine if environmental conditions exist that require reporting to regulatory agencies under existing environmental regulations or consent orders.

### **2.2 SURVEY METHODOLOGY**

This ES was conducted consistent with the ASTM Standards for Phase I Environmental Site Assessments (ASTM E 1527-94) and a project plan prepared in accordance with a Scope of Work for Environmental Survey, Property Adjacent to Oceana Salvage Yard, NAS Oceana, Virginia Beach, Virginia, dated 28 August 1996 under the terms of Contract Number N62470-

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95-D-6001, Delivery Order 005. The final, approved project work plans, consisting of a project plan, a field sampling plan, a health and safety plan, and a quality assurance project plan, are included as Appendix A to this report. A Site-specific Health and Safety Plan for this investigation was prepared and is included in the project plan. In accordance with the Scope of Work, the tasks associated with this assessment included:

- in-house review of readily-available records in possession of the Navy relating to the subject property;
- review of applicable Federal, state, and local environmental regulatory records;
- review of current and historic maps and photos for the property;
- completion of a title search to determine past property owners and potential land use going back a minimum of 60 years;
- conducting interviews with persons knowledgeable in activities at the property;
- completion of a field investigation of the subject property which included a visual inspection of the property, a legal boundary survey, a wetland delineation survey, sampling and analysis of surface soils, and a land survey to locate all sampling points and other site features; and
- evaluation of the analytical data and preparation of this report.

Refer to the project plans in Appendix A for more detail regarding survey methodology.

Ms. Kim Nelson and Mr. Michael Renga of ABB-ES conducted background research activities and a preliminary site inspection during the period 8-10 October 1996. Ms. Nelson, Mr. Renga, and Mr. Michael Cusick conducted the field sampling during the period 30 October through 1 November. Land surveying services were conducted by Miller Stephenson and Associates of Virginia Beach, VA and the wetland delineation was completed by McCarthy and Associates of Upper Marlboro, Maryland. Weather conditions during the inspections included limited or no cloud cover, recent heavy rains (but no rain during the inspections), and no snow cover. Weather conditions during the sampling consisted of moderate temperatures and intermittent rain.

The findings from the background research and field investigation are presented in this report. As specified in the project plan, a checklist format was used during the visual inspection and

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interviews, to document observations and information about the Subject Property. The completed checklist, along with other field notes, are included as Appendix B. Complete lists of all persons interviewed and all sources of information reviewed for this ES are included in Appendix C.

Federal and state environmental database records for the Site and surrounding properties were obtained through an environmental search report, prepared by Environmental Data Resources, Inc. (EDR) of Southport, Connecticut, and through review of state records at the Tidewater Regional Office of Virginia Department of Environmental Quality (VDEQ) on 17 September 1996. A title search report was prepared by Land Title Research, Inc. of Albany, New York. Additional land use information was derived from Navy records. A copy of the database search report is included in Appendix D. Title search information is included in Appendix E.

### **2.3 LIMITATIONS**

This ES report includes ABB-ES' observations, findings, and conclusions associated with the Subject Property. The evaluations, assessments, and conclusions contained in this report represent ABB-ES' professional judgement and opinions, and are based solely on visual observations made, and interviews conducted during, the site tours, and on information obtained through the search and review of Navy and other local, readily attainable records.

Except as specifically noted herein, this report does not reflect soil, surface water, or groundwater characteristics or chemical concentrations therein nor the potential presence of chemical compounds or analytes, which may be present but not observed, except as reported by others.

In the event any conditions differing from those described herein are encountered at a later time, ABB-ES requests the opportunity to review such differences and modify, as appropriate, the assessment and conclusions given in this report.

The information presented in this report may not be suitable for further use without adaptation for the specific purpose intended. Any such reuse or reliance upon the information, assessments, or conclusions contained in this report without adaptation shall be at the sole risk and liability of the party undertaking the reuse.

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### 3.0 BACKGROUND

The following is a summary of the information derived primarily from records reviews, site reconnaissance, and interviews conducted as part of this ES. A physical description of the Subject Property and surrounding area, along with a history of land use and ownership is included. A summary of the records review for environmental regulatory status of the Subject Property and surrounding properties is also included. Information contained herein was derived from sources as listed in Appendix C, including Navy (LANTNAVFACENGCOM and NAS Oceana) records, Virginia Beach municipal offices, Virginia Department of Environmental Quality, and the Virginia Beach Public Library.

#### 3.1 SITE DESCRIPTION

The following is a description of the physical layout of the Subject Property, as well as a summary of land use and ownership for the Subject Property and surrounding properties.

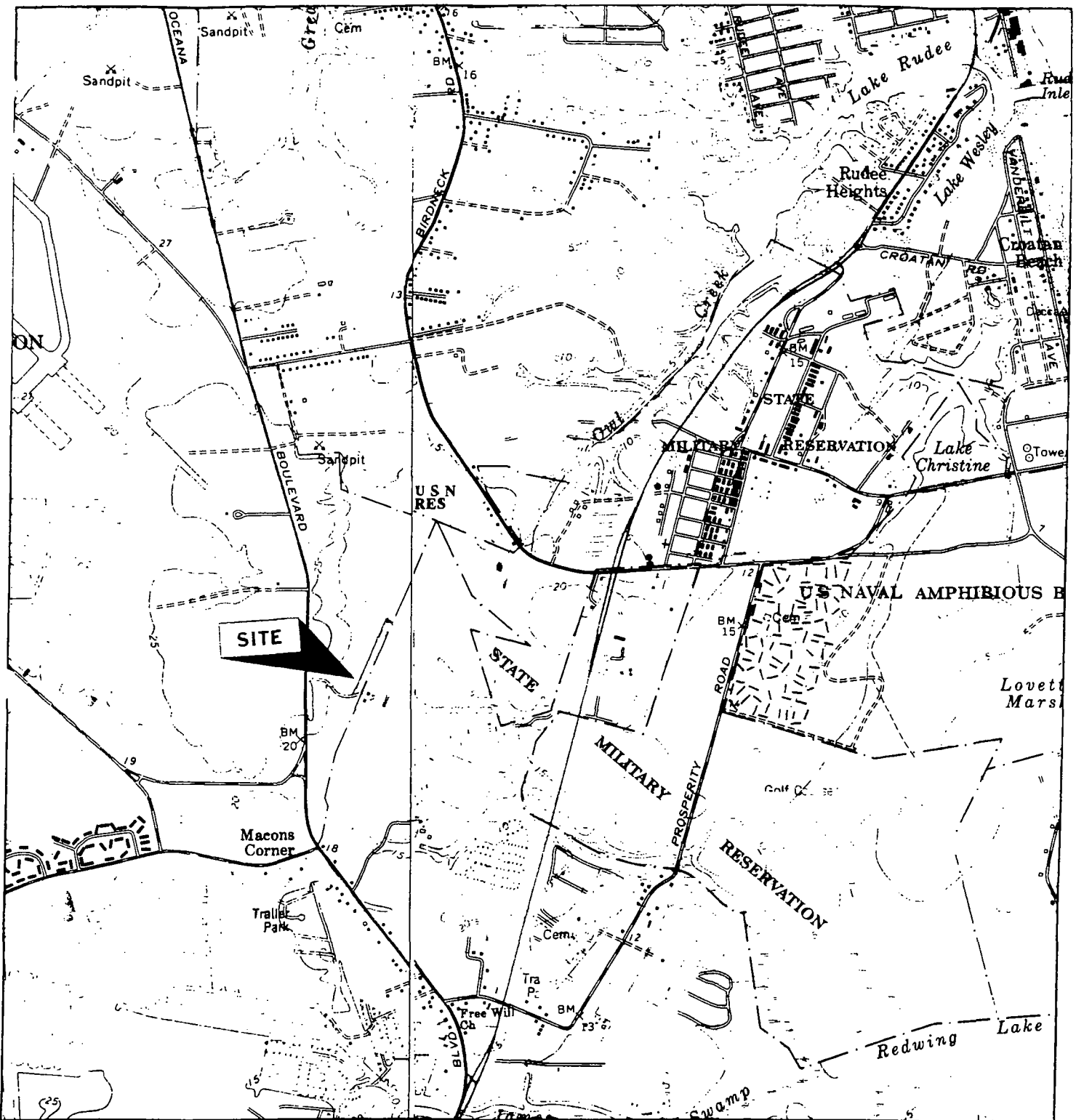
##### 3.1.1 Physical Setting

The Subject Property is located approximately two miles south of the boardwalk area and two miles west of the Atlantic Ocean in Virginia Beach, VA. It lies along the eastern property boundary of NAS Oceana, between Oceana Boulevard (Virginia State Route 615) to the west and General Booth Boulevard to the east (Figure 3-1). The nearest crossroads to the north and south are Bells Road and Harpers Road, respectively. Physical access to the Subject Property is via an unpaved roadway connecting Oceana Salvage Yard to Oceana Boulevard, approximately 1,200 feet north of the main entrance to NAS Oceana (Figure 3-1). Currently, access to the Subject Property is unrestricted from any direction. There is a gate at the western end of the access road, but the gate remains open, at least during normal business hours. The Navy is in the process of installing a three-strand barbed wire and post fence along the property boundary with Oceana Salvage (Interview 8).

The area of investigation for this ES (i.e., Subject Property) is approximately 1,600 feet long by 50 feet wide along the Navy/Oceana Salvage Yard boundary line and approximately 800 feet long by 40 feet wide along both sides of the access road (approximately 3.3 acres total; Figure 3-1). This area consists of densely wooded wetland (Figure 3-2), with an earthen ditch occupying approximately 1,000 linear feet of the common property boundary with the salvage yard (Figure 3-3). At the time of the field investigation, there was standing water (up to 40 inches deep) throughout the ditch. A VEPCO utility right-of-way crosses the northeastern corner of the Subject Property (Figure 3-4).

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SOURCE: U.S.G.S. TOPOGRAPHIC MAP  
7.5 MINUTE SERIES  
PRINCESS ANNE, VA 1965 PH. 1986  
VIRGINIA BEACH, VA 1965 PH. 1986  
SCALE 1:24,000

SCALE IN MILES 0 0.5 1  
SCALE IN FEET 0 1000 2000



**FIGURE 3-1**  
**SITE LOCATION MAP**  
**PROPERTY ADJACENT TO OCEANA SALVAGE**  
**NAS OCEANA**  
**VIRGINIA BEACH, VIRGINIA**



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There are currently no man-made structures located on the Subject Property and based on review of aerial photographs, no structures have existed historically. Several vehicles (salvage yard customers' or employees') were parked on Navy property, near the entrance to the salvage yard, throughout the field investigation. Other equipment was observed on Navy property on the south side of the access road, near the entrance to the salvage yard. This equipment included a smelter unit, and a boiler unit. Evidence of miscellaneous solid waste, similar in character to that observed at the adjoining salvage yard, was observed on Navy property, both along the access road and the common property boundary. ABB-ES identified at least seven discrete debris accumulation areas along the access road (as shown on Figure 3-4), with additional areas of scattered debris throughout the Subject Property. Materials observed included white goods, furniture, wooden pallets, rubber hoses, tires, battery casings, metal and plastic parts, engine parts, and vehicle components. Refer to Figures 3-5 and 3-6 for photographs of typical debris accumulations observed during the field investigation.

There are currently no utility services to the Subject Property. Miss Utility was contacted prior to initiation of field activities, and no utilities were marked in the field by their representatives. Utilities that service the area are described below:

**Water:** The City of Virginia Beach supplies potable water to local residences and commercial operations from the City of Norfolk water supply system. The City of Norfolk obtains its water from several surface water locations in the Norfolk area. None of these surface water locations are near the Subject Property. The nearest water supply pipelines are a 12-inch and 30-inch water main under Birdneck Road (Reference Map 12). The office building at Oceana Salvage is connected to one of these lines according to local utility maps (Reference Map 12).

According to information supplied by the Virginia Beach Environmental Health Office, there is no record of a private well permit for the Oceana Salvage property (Interview 16, Appendix F). No other information about potential private wells in the vicinity of the Subject Property was reasonably ascertainable from this source. According to information contained in the environmental database search report prepared by EDR (Appendix D), there are four private supply wells and one public supply well within a one mile radius of the Subject Property. The public supply well is located approximately one mile northeast of the Subject Property, near Birdneck Road. The system owner of record is Fort Story, and the well reportedly serves less than 2,500 people.

Private wells listed as non-community supplies are located east and south of the subject property at two nearby campgrounds, the Virginia Beach KOA and Holiday Trav-L Park. These wells also reportedly serve populations of less than 2500.

*Well also  
at Natural  
Resource Ctr*

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**SUBJECT PROPERTY-  
WETLANDS**



Looking east toward  
property boundary.



Looking west - Oceana Blvd.  
in background (near background  
sample location SS-033).

**FIGURE 3-2  
PHOTOGRAPHS  
PROPERTY ADJACENT TO  
OCEANA SALVAGE  
NAS OCEANA  
VIRGINIA BEACH, VA**



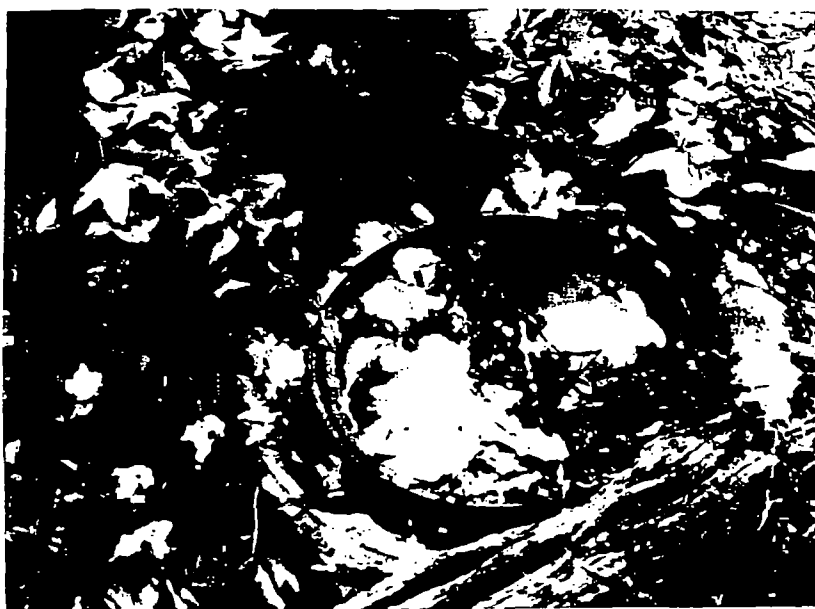
**DRAINAGE DITCH -  
ALONG PROPERTY BOUNDARY**



Looking north from south end  
of property.



Looking south from north end  
of property.



Opaque precipitate  
on water surface.

**FIGURE 3-3  
PHOTOGRAPHS  
PROPERTY ADJACENT TO  
OCEANA SALVAGE  
NAS OCEANA  
VIRGINIA BEACH, VA**

**Electricity:** Electricity is supplied to the area by Virginia Electric and Power Corporation (VEPCO). Overhead transmission lines are located in the easement on the adjoining property (Figure 2-1). Local telephone service is supplied by Bell Atlantic and GTE. An underground phone cable box was identified in the field by ABB-ES personnel on the north side of the access road, approximately 50 feet from Oceana Boulevard. It was not clear however whether the line extends in a north-south or east-west direction.

**Sewers:** Properties in the area are provided with sanitary service by the Hampton Roads Sanitation District. The nearest main line is a 42-inch forced main sewer line located under Birdneck Road (Reference Map 13). No storm sewers were observed in the vicinity of the Subject Property or adjoining properties.

### **3.1.2 Current and Past Property Ownership and Usage**

The results of the title search, historical map and air photo reviews, and other property use research for the Subject Property are summarized below. Title search documents are included in Appendix E and copies of significant historical maps and photos are included in Appendix F.

The original land purchase and runway construction for NAS Oceana occurred in 1940 (Reference Document 30). The Subject Property has been owned by the US Navy since the 1940s.

The site is currently part of an undeveloped buffer zone between activities at NAS Oceana and surrounding properties. Based on review of historical aerial photographs and topographic maps, and interviews with NAS Oceana personnel, the Subject Property has never been developed by the U.S. Navy, with the exception of the access road (Reference Maps 3, 5, 7 and Photos 1-4). According to Mr. Malbon, the access road was installed approximately 30 years ago. Based on evidence from topographic maps and air photos, the road was completed between 1955 and 1963.

The oldest photographic record for the Subject Property and surrounding area reviewed as part of this ES was from 1949 (Reference Photo 3, Appendix F). At that time the Subject Property appeared to be the western edge of an extensive forested tract, and the area between the current property boundary and Oceana Boulevard was cleared for agricultural use. According to Mr. Malbon, historic land use in the general area prior to the development of the air station was for agriculture (Interview 11).

According to the Air Installation Compatible Use Zones (AICUZ) Program, the Subject Property is designated as an Accident Potential Zone, Type II (APZ II) based on flight operations and conditions at NAS Oceana (Reference Map 15). APZ II is defined as a zone with some potential for accidents. According to the AICUZ Officer, no air accidents have occurred in the site area to date (Interview 7). Based on the frequency of air operations in the vicinity, the area including the Subject Property has also been designated as Noise Zone 3 (i.e., highest intensity; frequency and intensity of noise is loud and annoying; greater than 75 decibels).

The Navy has no proposed plans for change in land use for the Subject Property, with the exception of construction of a fence, in Fiscal Year 1997, along the property boundary with Oceana Salvage (Interview 8).

A proposed highway project, the Southeastern Parkway and Greenbelt, received approval by the City of Virginia Beach and the Virginia Department of Transportation in March 1996 (Reference 28). The Parkway will begin at Route 44, extend south, parallel to Oceana Boulevard, and connect with I-64 at the I-464 interchange in Chesapeake, VA. The proposed four-lane highway layout traverses the access road included in the Subject Property. Construction in the vicinity of the Subject Property is expected to begin by 2006 (Reference 28).

### **3.1.3 Current and Past Ownership and Usage of Adjoining Properties**

The results of the title search, historical map and air photo reviews, and other property use research for the properties adjoining the Subject Property are summarized below. Title search documents are included in Appendix E and copies of significant historical maps and photos are included in Appendix F. Figure 3-4 is a plan showing the legal property owners for the Subject Property and surrounding lands. At the request of the Navy Technical Representative, a title search was completed for the Oceana Salvage property only.

The adjoining land to the north, west, and south of the Subject Property is also owned by the U.S. Navy and maintained as part of the air station buffer zone. The Navy has owned the land since the 1940s. The oldest photographic record for the Subject Property and surrounding area reviewed as part of this ES was from 1949 (Reference Photo 3, Appendix F). At that time, the area between the Subject Property and Oceana Boulevard and north of the current access road location was cleared for agricultural use. This correlates with field observations of less mature and more widely-spaced trees in that area. There was also a building located approximately where the south side of the access road meets Oceana Boulevard. There were other scattered farms in the general area operated by sharecroppers on

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government-owned and private land (Interview 11). The field was apparently allowed to revert to forested wetland at some point in the 1950s; the building is not shown on a 1955 topographic map, and a series of 1966 air photos shows the vegetation well-established on the formerly cultivated parcel (References Map 7 and Photo 4, Appendix F).

There are two parcels of land that form the adjoining property east of the Subject Property. These are known as Parcel 9, owned by Rodney Malbon, Sr. and Lucetta Malbon and Parcel 6, owned by Rodney Malbon, Jr. Parcel 9 directly abuts the Subject Property and includes a pole easement for VEPCO. Parcel 6 abuts Parcel 9 on the east side. The property is currently operated as the Oceana Salvage Yard and consists of approximately 12 acres total (Reference Document 35). The salvage yard is currently used to store primarily scrap cars and trucks (Figure 3-7). Vehicle components are removed and resold and the remainder is scrapped. A car crushing unit is currently operated on-site. A small smelting unit was also observed (on Navy property) by ABB-ES personnel, although it was not in use at the time of the field investigation. At the time of the field investigation, most of the Salvage Yard property was covered with vehicles and debris including vehicle batteries, tires, rubber hoses, metal and plastic materials, glass, and other engine parts and vehicle components. Based on review of historical air photos, vehicles and other debris from the salvage yard operation have been stored on Navy property consistently over the life of operation of the salvage yard (Reference Photos 1-5).

According to the current site operator, Mr. Sonny Malbon, the Salvage Yard property has been in operation since the early 1960s and the property has been in his family since 1937 (Interview 11). Mr. Malbon also stated that the property was undeveloped forest in 1937, with the exception of an access road to three sharecropper's farms. According to title records, the original easement on Parcel 9 was granted by Mr. Malbon, Sr. to the US Coast Guard for a telephone and telegraph pole line in 1942 (Reference Document 36). In 1952, VEPCO was granted a 50 ft-wide right of way on the same property (Reference Document 36). The VEPCO easement crosses onto the Subject Property near the northern extent of the common boundary with the Salvage Yard (Figure 3-4). The access road from Oceana Boulevard to the Oceana Salvage Yard was created between 1955 and 1963, based on review of topographic maps and air photos. The original license granting Oceana Salvage use of the access roadway was signed in 1972 (Reference Document 34).

According to Mr. Sonny Malbon, the 4- to 8-foot wide drainage ditch that straddles a portion of the boundary between the salvage yard and the Subject Property was created by salvage yard personnel to facilitate surface drainage of the salvage yard property (Figure 3-3). The primary ditch extends north-south. ABB-ES also observed several places along the ditch where excavations extended westward onto Navy property. Some of these had been filled

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with debris (Figure 3-5; primarily rubber hose segments), while others contained standing water at the time of the field investigation. Mr. Malbon also confirmed that crushed battery casings had been used in the creation of the access road to the salvage yard (Figure 3-8). A remediation project to remove the crushed casings and stabilize the lead in the remaining soil is ongoing at the salvage yard (it should be noted that the remedial effort occurred on Navy property). Refer to Section 3.3.2.2 for additional details regarding the regulatory response actions at the Salvage Yard.

### **3.2 ENVIRONMENTAL SETTING**

Information on the environmental setting for the Subject Property was derived from records provided by the Navy, or obtained from other local sources, as documented in Appendix C. This information was supplemented by observations made during the field investigation.

**3.2.1 Geology/Hydrogeology** The Virginia Beach area is underlain by marine and fluvial sedimentary deposits of the Atlantic Coastal Plain physiographic province. These deposits consist of layered sands, gravels, silts, and clays in an eastward-dipping and thickening wedge. The uppermost stratigraphic units in this sequence are the Columbia Group (ground surface to a maximum depth of approximately 80 ft bls) and the Yorktown Formation (from depths of approximately 60 ft bls to 150 ft bls), which are also the principal aquifers in the region (Reference Document 41).

Soil types at the Subject Property are mapped by the US Soil Conservation Service as primarily the Acredale silt loam, with the Tomotley loam and the Dragston fine sandy loam mapped along the access road (Reference Document 43; Appendix F). The Acredale soils (to a depth of approximately three feet bls) are described as slightly plastic, mottled gray, fine to medium sandy silt with some root structures (Reference Document 42). This description was confirmed in the field during shallow soil sampling activities.

Shallow soils at the Subject Property are part of the Columbia Group, which comprises the water table aquifer (Reference Document 41). Depth to groundwater at the Subject Property is very shallow (less than two ft bls at most locations), based on observations during the soil sampling program. Water-bearing sand and shell units are relatively thin and discontinuous, due to the depositional history of the shallow deposits. Because of the discontinuous nature of these shallow units and the water quality, the water table aquifer is suitable only for low-yield and non-potable supply wells (Reference Document 40). The water table aquifer is separated from the underlying Yorktown aquifer by relatively thick (20 to 40 ft) beds of silt

41? - 42?

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**SALVAGE YARD PROPERTY**

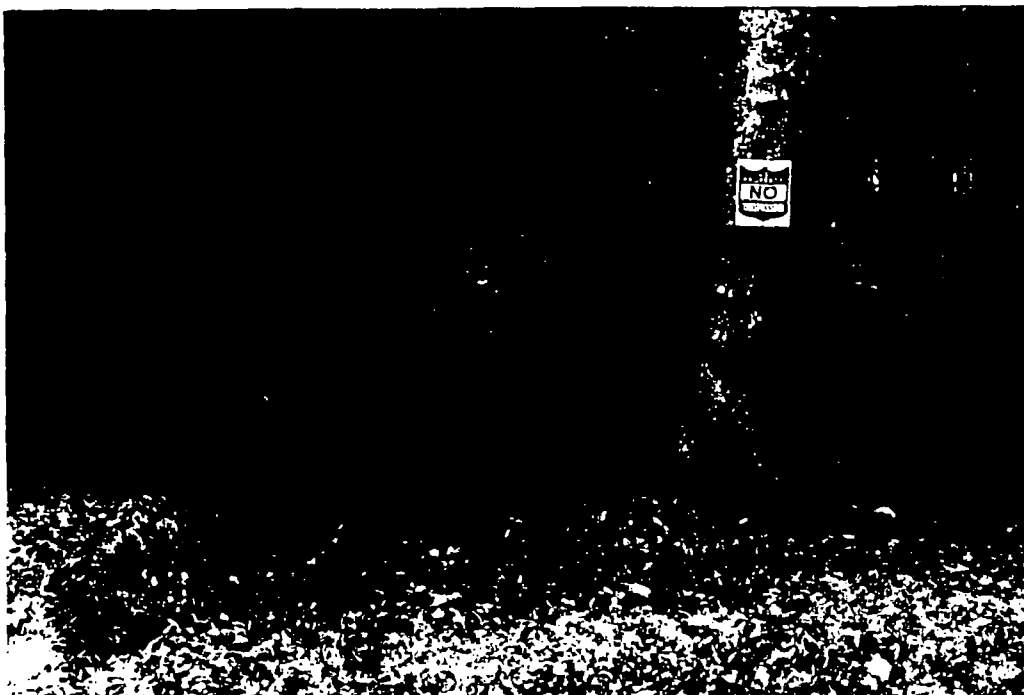
Looking east from the property boundary. Note tire pile in background.



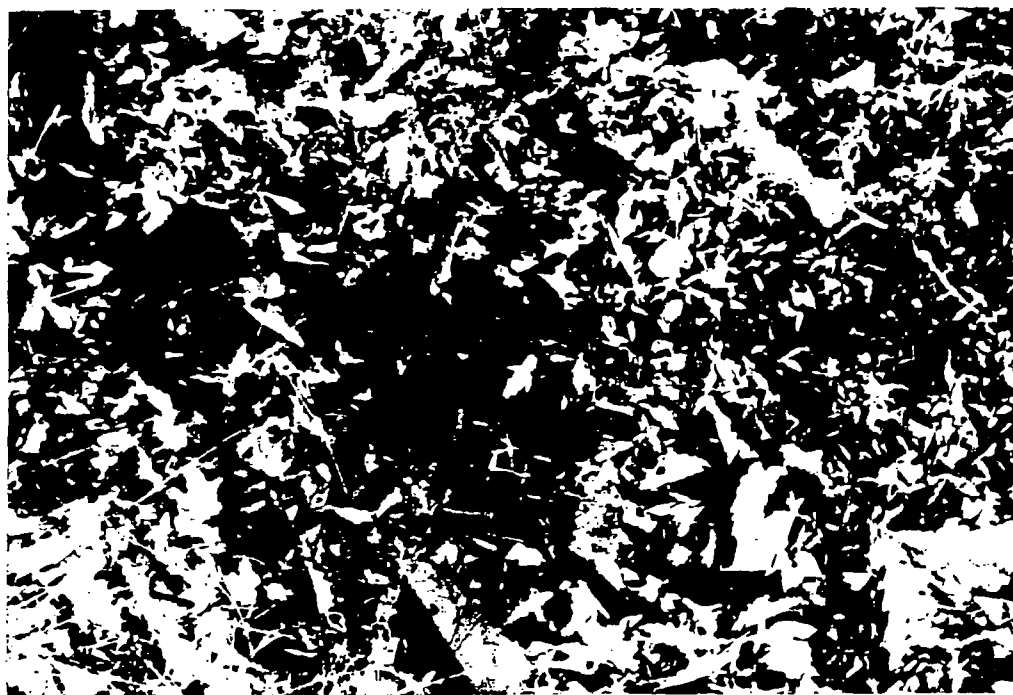
Looking northeast from SS-020 (Lead)  
Car crushing unit in left background.  
Sample location in surface runoff path  
from crusher.

**FIGURE 3-7  
PHOTOGRAPHS  
PROPERTY ADJACENT TO  
OCEANA SALVAGE  
NAS OCEANA  
VIRGINIA BEACH, VA**

**DEBRIS AREAS -  
BATTERY CASINGS  
(DEBRIS AREA 4)**



Looking south -  
south side of access  
road. Entire grassy area  
underlain by crushed  
casings.



Sample location SS-029  
(Lead) Close-up of  
casing material

**FIGURE 3-8  
PHOTOGRAPHS  
PROPERTY ADJACENT TO  
OCEANA SALVAGE  
NAS OCEANA,  
VIRGINIA BEACH, VA**

and clay. The Yorktown is considered a leaky artesian aquifer (Reference Document 41), and serves as the primary public water supply source in the area. Wells screened in the Yorktown derive water from depths exceeding 100 ft bls.

Information contained in USEPA's National Radon Database for the Virginia Beach area indicates that the average value (for 9 locations sampled) for first floor living areas was 0.489 picoCuries per liter (Reference Document 38). The USEPA action level for radon is 4 picoCuries per liter (USEPA 1986; OPA-86-004).

**3.2.2 Topography/Surface Drainage** The land surface of the Subject Property slopes gently from west to east, with elevations ranging from approximately 25 feet above mean sea level (ft msl) along Oceana Boulevard to approximately 15 ft msl along the boundary with the salvage yard (Figure 3-1). This mirrors regional topography which slopes eastward to the Atlantic coastline. Locally, there is a slight westward slope from the adjoining Salvage Yard property towards the Subject Property, just north of the access road. The Subject Property is located within an eastward-draining watershed that includes Owl Creek, Redwing Lake, and Lake Tecumseh (Reference Document 43).

The Subject Property is poorly drained, particularly along the boundary with the salvage yard. According to Mr. Malbon, Sr., the shallow, open drainage ditch that parallels the utility easement and property line was excavated by salvage yard personnel to aid drainage across the yard (Interview 11). Water in the ditch was not flowing at the time of the field investigation. The nearest mapped surface water feature is an unnamed, man-made drainage feature that parallels the south side of the access road and southern salvage yard property boundary and then turns to the southwest before draining into wetlands associated with Redwing Lake (Figure 3-1; Reference Map 2). ABB-ES saw no visual evidence of this drainage feature along the access road, and the visual inspection did not extend onto the southern portion of the salvage yard property. There was evidence of a small area of ponded water adjacent to the south side of the access road, approximately midway between the salvage yard and Oceana Boulevard, observed in air photos of the area taken in 1966 (Reference Photo 4).

**3.2.3 Wetland** A wetland delineation survey was completed at the Subject Property as part of this investigation on 30 October 1996 by McCarthy & Associates, Inc. The results of the survey are summarized below. Refer to Appendix G for the complete text of the survey report. Wetland boundaries, as mapped in the field, are shown on the base map for the site (Figure 3-4).



Using the Corps of Engineers wetland delineation criteria, an area is considered non-tidal wetland if positive indicators of three parameters are present. Positive indicators for all three (hydric soils, wetland hydrology, and hydrophytic vegetation) were identified at the Subject Property, extending on to the salvage yard property. The only portion of the area of investigation identified as upland was a narrow border along both sides of the access road.

**3.2.4 Climate/Meteorology** The Norfolk region has a maritime climate with an average winter temperature of 42 degrees Fahrenheit and an average summer temperature of 77 degrees (Reference Document 43). The climate is characterized by long temperate summers and mild winters. Winds are predominantly from the southwest and moderate. Average annual precipitation is 45 inches with over 50 percent falling between April and September. The average annual snowfall is 7.2 inches.

**3.2.5 Surrounding Land Use/Demography** The Subject Property is part of an undeveloped buffer zone at NAS Oceana (Reference Document 15). This buffer extends north and south of the Subject Property, along Oceana Boulevard. Activities at the air station are concentrated west of the site, with the nearest runway located approximately one mile northwest of the site. The salvage yard is the only commercial operation on adjoining property. Two campgrounds are located approximately 0.5 miles east of the Subject Property. Both campgrounds have private water supply wells (Reference Document 38).

The nearest residential properties are located approximately 0.5 miles to the south (along Oceana Boulevard), north (along Bells Road), and northeast (along Birdneck Road). Refer to Figure 3-1 for locations.

### **3.3 RECORDS REVIEW**

In accordance with standard ASTM guidelines, ABB-ES reviewed federal and state environmental databases to identify potential environmental liabilities associated with the Subject Property or with nearby properties which could have an impact on conditions at the Subject Property. The target radii referenced in the following subsections vary for each database and are derived from the Standard Practice for Phase I Environmental Site Assessments (ASTM Standard 1527-94). The database report was provided by Environmental Data Resources, Inc. (EDR) of Southport, Connecticut and is included as Appendix D. The database report generally focuses on listed sites within one mile of the target property and includes maps showing the locations of most of the listed sites. In some cases, EDR database information is insufficient (e.g., latitude and longitude not provided) to pinpoint the location of the listed sites on the EDR computer generated map. In these cases of "unmapped sites", ABB-ES has compared the listed addresses for these facilities with local road maps and the

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USGS topographic maps to provide the approximate site locations. The Subject Property was not listed in any of the databases searched by EDR.

### **3.3.1 Federal Records**

#### **3.3.1.1 Federal CERCLA Databases**

ABB-ES reviewed the National Priorities List (NPL-Superfund) database listing provided by EDR. There are no NPL sites listed within one mile of the Subject Property, nor is the Subject Property itself an NPL site.

ABB-ES reviewed the Comprehensive Environmental Response, Compensation and Liability Act Information System (CERCLIS) Site/Event Listing database listing provided by EDR. This database was last updated March 31, 1996. There are no CERCLIS sites located within one-half mile of the subject property. The Subject Property is not a CERCLIS site, nor is it listed in the Emergency Response Notification System (ERNS) database.

#### **3.3.1.2 Federal RCRA Databases**

ABB-ES reviewed the USEPA Resource Conservation and Recovery Act Information System (RCRIS) database listing provided by EDR. The RCRIS database lists Treatment, Storage, and Disposal (TSD) facilities and large quantity hazardous waste generators within one mile of the subject property, as well as small quantity hazardous waste generators within one-quarter mile of the subject property. The database was last updated on May 31, 1996. There is one RCRIS-TSD facility located approximately one mile southwest of the property. This facility, Controls Corporation of America, located at 1501 Harpers Road is also a RCRIS large quantity generator. The facility identification number is VAD098442148. The Subject Property does not appear on the RCRIS database.

### **3.3.2 State Environmental Records Review**

#### **3.3.2.1 State Databases**

ABB-ES reviewed the listings for the following four state environmental databases, as summarized in the EDR report:

- State Hazardous Waste Sites (SHWS; equivalent to federal CERCLIS)
- Solid Waste Facilities/Landfill Sites (SWF/LS)
- Leaking Underground Storage Tank Incident Reports (LUST; the VA Spills database)

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**Registered Underground Storage Tanks (UST)**

**SHWS:** The EDR report lists no SHWS within one mile of the Subject Property.

**SWF/LS:** The EDR report lists no SWF/LS sites within one-half mile of the Subject Property.

**LUST:** The EDR report lists three mapped LUST sites between one-quarter and one-half mile of the Subject Property. Two of the leaking tank sites are located at the City of Virginia Beach Maintenance Yard at 949 South Birdneck Road, located northeast of the Subject Property, and the third LUST site is a 7-Eleven at 1205 South Oceana Boulevard, located south of the Subject Property. None of the mapped sites are located on abutting properties, or are expected to impact the subject property because they are likely hydrologically cross-gradient or down-gradient.

ABB-ES also reviewed the VDEQ Spills Database (Reference 21) at the Tidewater Regional Office. All incidents of leaking tanks listed above were reported as closed cases.

**USTs:** The EDR report lists no UST sites within one-quarter mile of the subject property.

**3.3.2.2 State Files - Oceana Salvage Yard**

ABB-ES reviewed site-specific files at the VDEQ Tidewater Regional Office on 17 September 1996. No record of the Subject Property was identified in files for NAS Oceana. Files pertaining to Oceana Salvage Yard were also reviewed. Table 3-1 summarizes the chronology of environmental actions/regulatory involvement with the Salvage Yard. According to Ms. Kerita Kegler of VDEQ, no enforcement actions have been brought against Oceana Salvage Yard as of 17 September 1996 (Interview 12).

**TABLE 3-1**  
**Chronology of Environmental Response**  
**at the Oceana Salvage Yard**

**Environmental Survey**  
**Property Adjacent to Oceana Salvage Yard**  
**NAS Oceana, Virginia Beach, VA**

Date	Summary of Events
4/1/92	Va State Water Control Board (SWCB) Pollution Complaint #92-1814 - Anonymous caller to USEPA Region III reported release of gasoline and battery acid to Back Bay Creek from Oceana Salvage.
4/2/92	VA SWCB Pollution Complaint #92-1830 - Approximately 50 gallons of petroleum product spilled on ground at Oceana Salvage; however, did not reach surface water. State made Oil Spill Violation Report to US Coast Guard regarding incident.
8/24/92	SWCB Pollution Prevention Inspection Report #92-1830 - Inspector noted contaminated soil from oil, antifreeze, fluid spills near car crusher. Large piles of tires and general debris scattered along roadway.
11/3/92	VDEQ Complaint #RI-001381 - SWCB follow-up inspection reported staging area established for car crushing unit (fluids drained and drummed). Clean-up not complete; potential release threat remains.
1/17/93	VDEQ Complaint #RI-002576 - Complaint received of dumped gasoline, broken batteries, and filled wetlands at Salvage Yard. Report referred to Emergency Response.
4/21/93	VDEQ inspection to follow-up on complaint
6/7/93	VDEQ Follow-up inspection found conditions were unchanged after initial inspection on 4/21/93. Reported battery recycling operation near entrance to yard.
7/8/93	VDEQ informed Mr. Malbon that he is operating an unpermitted battery reclamation facility. VDEQ requested soil and groundwater samples be collected at battery storage location and disposal or permit for reclamation activities.
7/21/93	Meetings between VDEQ, and Mr. S. Malbon (salvage yard owner) and his attorney to discuss batteries. Mr. Malbon reported no active battery reclamation on-site; what was viewed during inspections was the crushed casings of batteries brought in from a nearby farm approximately 30 years ago.
10/5/93	VDEQ Complaint #RI-001381 (based on initial 1992 complaint call) case closed out. Issues rolled in to Complaint #RI-002576 (reference to lead battery disposal).
10/22/93	Status report by EnviroSolutions: Soil and groundwater samples taken in 10/93 - sampling methods and sample depths unclear. Lead concentrations exceed standards. Remediation of solid waste on Navy's property underway. Evaluating tire disposal options. Proposed bioremediation (on-site) for petroleum-contaminated soils
11/2/93	VDEQ reviewed proposed site remediation actions and requested detailed plan before approval of bioremediation granted.

**TABLE 3-1**  
**Chronology of Environmental Response**  
**at the Oceana Salvage Yard**

**Environmental Survey**  
**Property Adjacent to Oceana Salvage Yard**  
**NAS Oceana, Virginia Beach, VA**

Date	Summary of Events
11/11/93	Inspection by NAS Oceana representative (B. Hostetter) identified extensive filling of 1.5 acres of NAS Oceana wetlands resulting from improper disposal of tires, auto parts, and various wastes.
12/15/93	<p>Status report by EnviroSolutions includes pollution prevention plan:</p> <ul style="list-style-type: none"> <li>- Additional soil borings confirm clay layer underlies battery tailings area.</li> <li>- Solid waste remediation 50% complete (15 trailer loads).</li> <li>- 100,000 lbs of scrap steel tire rims removed.</li> <li>- Tires being stockpiled separately on Salvage Yard property awaiting recycling. Intent to establish pyrolysis unit on-site.</li> <li>- Reports additional soil and groundwater results below lead action levels.</li> <li>- Reports groundwater flow in westward direction (towards NAS Oceans)</li> </ul>
1/7/94	VDEQ review of Project Summary Report prepared by EnviroSolutions prohibited tire recycling without a VDEQ permit. Also requested sampling results be forwarded for review.
2/11/94	Meeting between NAS Oceana and VDEQ. Navy concerns include impact to groundwater, background sampling, drainage of surface water, and disturbance of wetlands.
2/22/94	VDEQ requested additional soil and groundwater sampling be conducted in accordance with EPA guidelines to delineate extent of contamination and submit report within 60 days. Also requested removal of casings and more solid waste in wetlands.
2/25/94	<p>On-site meeting with VDEQ, EnviroSolutions, S. Malbon, and D. Owens (legal counsel) to discuss 2/22 letter from VDEQ.</p> <ul style="list-style-type: none"> <li>• First task to remove battery casings and as little soil as possible. Any soil removed must remain on Navy property</li> <li>• Permanent wells or piezometers must be installed within area of contamination as well as around boundaries.</li> <li>• Areal extent of contamination to be defined during removal action.</li> <li>• Solid waste in wetlands directly west of battery casings must be removed.</li> <li>• Report of findings and remedial option selected due in 60 days.</li> </ul>
4/1/94	On-site meeting with VA Beach Hazmat Team, DEQ-Waste and Water, and Dept. of Emergency Services, and site representatives to evaluate fire hazards and fire response plan for the site. Recommended relocating and splitting tire piles, and surrounding them with earthen berms.
9/6/94	EnviroSolutions submitted evaluation of battery case cleanup to VDEQ. Proposed removal and solidification/stabilization.
3/24/95	VDEQ approved permission for bench-scale testing of lead stabilization. Requests additional information regarding tire disposal.

**TABLE 3-1**  
**Chronology of Environmental Response**  
**at the Oceana Salvage Yard**

**Environmental Survey**  
**Property Adjacent to Oceana Salvage Yard**  
**NAS Oceana, Virginia Beach, VA**

Date	Summary of Events
6/6/95	EnviroSolutions submitted a Pilot Project Summary of onsite solidification/stabilization of lead contaminated soil and reported technique effective.
8/1/95	VDEQ reviewed a pilot study report for treatment of lead battery soil at Oceana Salvage and found treatment levels were not achieved in all cases. VDEQ again requested information on disposal of tires and threatened formal enforcement procedures.
9/25/95	NAS Oceana inspection identified battery casings, and excavated soil, and general debris along access road on NAS Oceana property. Notified Mr. Malbon of duty to remedy.
9/26/95	NAS Oceana (W. Bullard) notified USEPA (via telephone) of release or threat of release of hazardous materials in accordance with RCRA 3008(h) Consent Order held by NAS Oceana. Release involves creation of stockpile of lead-contaminated soil (approx. 400 cu. yds.) on bare ground from battery casing remediation area. Follow-up letter confirmation of notification submitted 9/29.
9/27/95	Inspection by VDEQ of Salvage Yard indicated that batteries and contaminated soil had been moved to another section on Navy property.
10/11/95	Meeting requested by VDEQ with S. Malbon to discuss cleanup effort.
10/23/95	Final deadlines issued to Sonny Malbon to remove soil and battery mixture from Navy property and cleanup lead contaminated area. Formal enforcement procedures threatened.
11/22/95	NAS Oceana inspection observed most debris along access road removed. Battery casings and soil pile moved to salvage yard property.
11/30/95	VDEQ Site inspection indicated that battery area was graded and waste mixture was stored in a pile covered with plastic sheeting. Tires were scheduled for offsite disposal.
1/12/96	Letter from VDEQ to Oceana Salvage stating cleanup activities at Oceana Salvage have not been completed. Violations include no hazardous waste storage permit and improper storage of wastes. VDEQ has initiated enforcement actions.

## **4.0 FIELD INVESTIGATION**

The following is a summary of field investigation activities conducted at the Subject Property during October and November 1996. Field investigation activities were conducted in accordance with the procedures and methodology outlined in the approved project plans (Appendix A). These activities are summarized in Section 4.1. A summary of analytical results is provided in Section 4.2.

### **4.1 FIELD ACTIVITIES**

Field activities were conducted in October and November 1996 and included a land survey, wetland survey, and soil sampling and analysis. An initial site walkover was conducted on 9 and 10 October 1996 to gain an overview of present Subject Property conditions and uses. Representatives from NAS Oceana (Mr. Will Bullard), ABB-ES (Ms. Kim Nelson and Mr. Michael Renga), and MSA (land survey contractor; Mr. Jeff Vierrether) were in attendance. The field notes and observations recorded during the site walkover are summarized in checklist form and included in Appendix B.1. Additional field notes and photo logs are included in Appendix B.2. Figure 4-1 includes photographs of representative sample locations.

#### **4.1.1 Land Survey**

A land survey was conducted by MSA to appropriately mark the legal boundary (i.e., property line) between the Subject Property and the adjacent Oceana Salvage Yard. The boundary line was marked in the field using grade stakes and orange flagging. Existing boundary markers such as iron pipes were used as available. In addition, a land survey was conducted by MSA to locate all soil sample locations, wetland boundaries, and debris piles and other features identified during the site reconnaissance efforts. The land survey was completed on 14 November 1996 using established coordinate systems (i.e. benchmarks) and the total station method. The survey was conducted with a data collector and an electronic distance measuring (EDM) instrument with leveling capabilities. The survey plan is included as Figure 3-4. Supporting documentation (i.e., Surveyor's notes) are included in Appendix B.3.

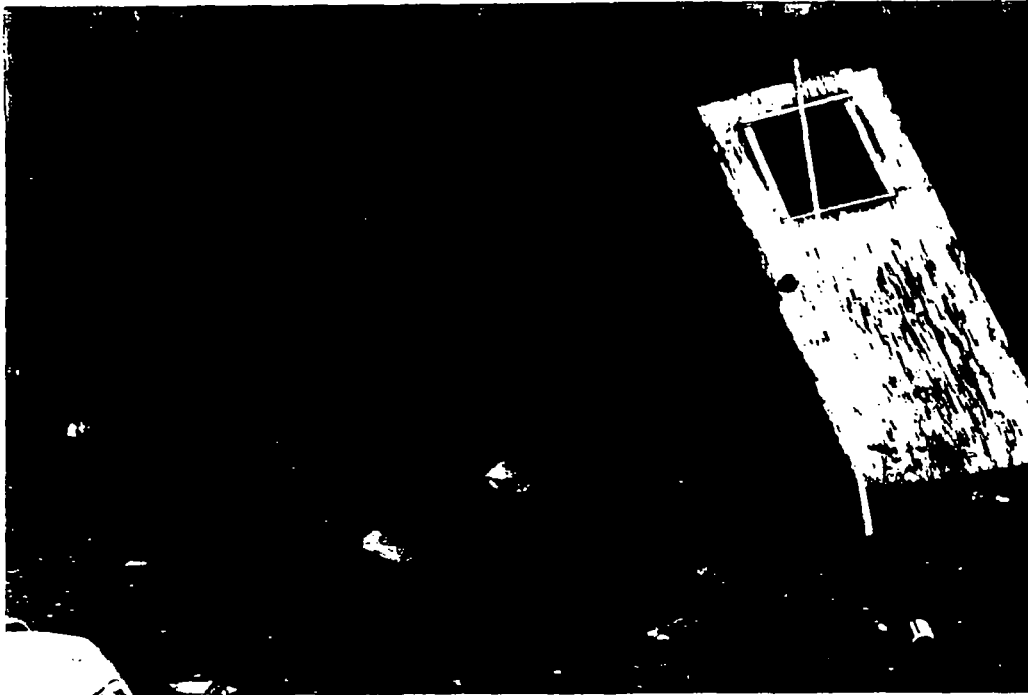
#### **4.1.2 Wetland Delineation Survey**

A wetland survey was conducted by Mr. James Irre of McCarthy & Associates to identify and delineate wetlands at the Subject Property. Wetlands were identified in accordance with the U.S. Army Corps of Engineers "Wetland Delineation Manual" (Technical Report Y-87-1, 1987). The survey was completed on 30 October 1996 and consisted of collecting soil

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## SAMPLE LOCATIONS



(a) Looking south - SS-001  
(Lead, PCBs, PAHs) Large  
stake marks property line.



(b) Looking south - Sample  
location SS-027 (Lead,  
PCBs). Tailings near  
smelter unit

**FIGURE 4-1**  
**PHOTOGRAPHS**  
**PROPERTY ADJACENT TO**  
**OCEANA SALVAGE**  
**NAS OCEANA**  
**VIRGINIA BEACH, VA**



## SAMPLE LOCATIONS



(c) Looking Southeast - salvage yard  
in background. Sample location SS-006  
(Lead)



(d) Looking southeast - sample  
location SS-005 (Lead).



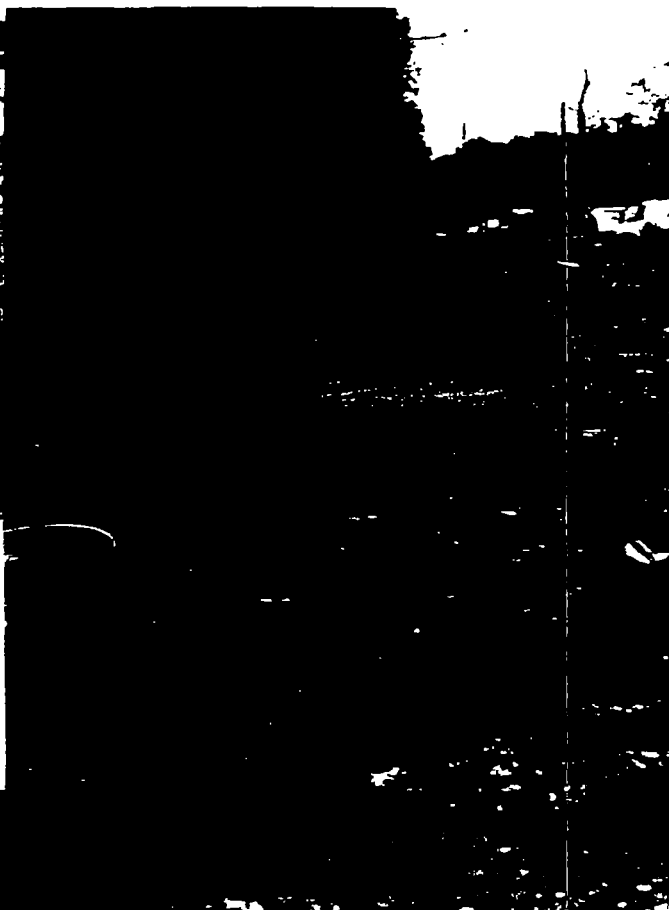
(e) Looking southeast - sample  
location SS-004 (Lead).

**FIGURE 4-1 (CONT.)  
PHOTOGRAPHS  
PROPERTY ADJACENT TO  
OCEANA SALVAGE  
NAS OCEANA  
VIRGINIA BEACH, VA**

**SAMPLE LOCATIONS**



(f) Looking east (salvage yard office in background). Sample location SS-018 (Lead).



(g) Looking north along property line near SS-017. Note slight surface slope westward.



(h) Looking southeast near property line. Sample location SS-019 (Lead)

**FIGURE 4-1 (CONT.)  
PHOTOGRAPHS  
PROPERTY ADJACENT TO  
OCEANA SALVAGE  
NAS OCEANA  
VIRGINIA BEACH, VA**

# **SAMPLE LOCATIONS**



(i) Sample location SS-026

Looking south toward access road. Note standing water and marsh grass vegetation in background (pink flag marks wetland boundary). Edge of lead remediation area.



(j) Sample locations SS-034 (left foreground) and SS-002 (right foreground) - (Lead). Looking southeast - vehicles parked on Navy property in area of lead remediation project.



(k) Sample Location SS-002 - (Lead). Looking east  
Strong petroleum odor and sheen on water in sample.

**FIGURE 4-1 (CONT.)  
PHOTOGRAPHS  
PROPERTY ADJACENT TO  
OCEANA SALVAGE  
NAS OCEANA  
VIRGINIA BEACH, VA**

**SAMPLE LOCATIONS**



(l) SS-028 (Lead) - Looking  
northwest near southeast  
end of access road



(m) SS-029 (Lead) - Debris  
Area-Battery casings along  
access road

**FIGURE 4-1 (CONT.)  
PHOTOGRAPHS  
PROPERTY ADJACENT TO  
OCEANA SALVAGE  
NAS OCEANA  
VIRGINIA BEACH, VA**

samples, identifying plant species, and flagging the extent of wetland on the Subject Property. Figure 3-2 is representative of the wetland on the Subject Property. The complete survey report is included as Appendix G and is summarized as follows.

Two representative soil samples were collected to determine if they exhibited characteristics commonly associated with soils found in aquatic moisture regimes (i.e., wetlands). Soil sample 1 was collected in the vicinity of ABB-ES sample location SS-09 and soil sample 2 was collected near SS-04 (Figure 3-4). Soil samples were collected using a hand auger at depths from zero to eighteen inches bls. The soils were determined to have aquatic regime characteristics.

Another component of the wetland survey was to identify hydrophytic vegetation (i.e., plant species) using the methods described in the Wetland Delineation Manual and wetland indicator categories published by the U.S. Fish and Wildlife Service. Twenty-four plant species were positively identified as plants that exist in tidal or non-tidal wetlands. The wetland boundaries were marked on-site using red and white dotted surveyor's flagging and pink pin flags labeled "NTW" (non-tidal wetland), after the plant species and soil samples were collected. The limits of the delineation terminate at the Navy property staked in the field, however, the wetlands do extend onto the Oceana Salvage Yard property.

#### **4.1.3 Soil Sampling**

Soil sampling was conducted by ABB-ES from 30 October and 1 November 1996. The primary objective of the soil sampling was to collect representative, defensible analytical data to document current environmental conditions at the Subject Property. To achieve this objective, soil samples were collected from locations as shown on Figure 4-2. Refer to the Field Sampling and Analysis Plan (Appendix A) for specific information on sampling techniques. Completed soil sampling field logs are included as Appendix B.4. Refer to photographs in Figure 4-1 for conditions at specific sample locations.

A total of 34 shallow soil samples were collected from both biased and unbiased locations. Sample locations were marked in the field with numbered orange pin flags. One sample (SS-33) was collected from Navy-owned wooded wetland adjacent to the Subject Property, as shown on Figure 4-2 to represent local background soil characteristics. This location was selected because it was removed from any visible debris accumulations, there were no visible surface water runoff channels or impoundments impacting the location, the soil appeared to be of similar character to many of the field samples, and it was removed from the edge of roadways and associated particulate sources (Figure 3-2).

For the unbiased samples, 16 soil locations were flagged, at 100-foot intervals, along the common boundary between the Subject Property and the salvage yard. Unbiased locations were numbered consecutively, from south to north, beginning near the property boundary stake and the large boiler unit located directly south of the access road (Figure 4-1a). The remaining 17 samples were collected from biased locations along the property line and along both sides of the access road where debris accumulations were noted or where there was other visual or olfactory evidence of potential contamination.

At each pre-marked sampling location, a surface soil or shallow subsurface soil sample was collected using a stainless-steel hand auger or spoon. The soil volume was transferred to a stainless-steel bowl using a spoon or spatula. Sample containers requiring VOC analysis were filled first and the remaining soil volume was homogenized (i.e., composited) in a stainless steel bowl. The homogenized soil was then transferred directly to the appropriate sample containers for laboratory analysis.

Soil samples were identified by a 15-character system described in the FSP (Appendix A). The first three digits represent the site name ("OES" for Oceana Environmental Survey); the next two digits represent the sample type ("SS" for surface soil); the next three digits represent the soil boring/location number (i.e., "001" to "034"); the next three digits identify the maximum depth the soil sample was collected (i.e., "000" for 0 - 12 inches, "001" for 12 - 24 inches); the next two digits refer to the event number ("01" for this event); and the last two digits identifies those samples collected for QA/QC purposes (i.e., "XX" for soil sample, "MS" for matrix spike). For example, sample ID number OES-SS-016-000-01-XX refers to soil sample collected from location 16 at a maximum depth of 12-inches below ground.

A PID instrument was used to monitor organic vapor readings for both Health and Safety monitoring and to determine appropriate sample depth. The depth of the soil samples collected were determined in the field by soil screening with a PID and visual and olfactory observations. The maximum depth of any boring was the water table, which in most locations was less than 2 feet. The surface or subsurface soil with the maximum PID reading or other evidence of contamination (i.e., buried debris, discolored soil, strong odors, etc.) was submitted for analyses. The deepest sample was collected at 4 feet below land surface (bls) at SS-026. The majority of samples collected (74%) were from 0 - 12 inches bls due to the high water table. The highest PID reading (271 ppm) occurred at unbiased location SS-02 (Figure 4-1k). As a result, additional biased samples were collected in this area (SS-34 and SS-26; Figure 4-1i and j). Evidence of buried debris (battery casings, metals, plastics, rubber) was observed at SS-02, SS-04, SS-05, SS-18, SS-20, SS-21, SS-22, SS-25, SS-26, SS-27, SS-28, SS-29, and SS-34.

Quality control (QC) measures including daily instrument calibration and QC sample collection were performed and documented in field logs (Appendix B.2). Appropriate QC samples collected and submitted for analysis with the soil samples are summarized in Table 4-1. In addition, one sample of the decontamination fluid was submitted for full suite analysis. All samples collected were shipped for overnight delivery via Federal Express on 1 November 1996 to Quanterra Laboratories (North Canton, OH) under appropriate chain-of-custody (COC). Completed COC forms are included in Appendix H.

#### **4.2 SUMMARY OF ANALYTICAL RESULTS**

All soil samples were submitted to Quanterra Analytical for analysis of volatile organic compounds, semivolatile organic compounds, pesticides, polychlorinated biphenyls, and inorganics (including total cyanide) in accordance with appropriate USEPA Contract Laboratory Program Statements of Work (SOW). Samples were submitted in two sample delivery groups (OES-01 and OES-02) to the laboratory, corresponding to the two days of sample collection. QC samples corresponding to these two groups are summarized in Table 4-1. No concentrations above detection limits were detected in either the trip blank or rinsate blank samples collected as part of this sampling effort. The data were not submitted for full validation, however ABB-ES reviewed the sample narrative reports from the laboratory (Appendix H) and also evaluated holding times and reproducibility. No significant problems were identified that would compromise the use of these data.

The following is a summary of analytical results. Positive detections (i.e., hits) have been summarized in tables included in each subsection below. A full summary of analytical results is included as Appendix H. One set of full CLP data packages is available at NAS Oceana Civil Engineering (Point of Contact is Mr. Will Bullard).

In order to evaluate the significance of analytical results, detected concentrations have been compared to the site-specific background sample results (sample location SS-033) and to USEPA Region III Risk-Based Concentrations (RBCs; May 1996) for soils (ingestion at industrial setting). These RBC values are commonly used for screening-level evaluations to determine if additional investigation or remedial action is required. Figure 4-2 is a graphic display of sample locations where screening criteria were exceeded.

##### **4.2.1 Volatile Organic Compounds**

Thirty-seven field samples, along with appropriate QC samples were submitted for VOC analysis in accordance with USEPA CLP SOW OLM01.9 using gas chromatography/mass spectrometry (GC/MS) instrumentation. Samples were analyzed for 33 specific compounds.

Table 4-1  
Summary of QC Samples Collected

Environmental Survey  
Property Adjacent to Oceana Salvage Yard  
NAS Oceana, Virginia Beach, VA

Sample ID No.	Sample Type	Location	Date Collected	Matrix
OES-SS-035-000-01-DS	(blind replicate)	SS-02	11/1/96	soil
OES-SS-036-000-01-DS	(blind replicate)	SS-08	10/31/96	soil
OES-SS-037-000-01-DS	(blind replicate)	SS-18	11/1/96	soil
OES-SS-020-000-01-MS	Matrix Spike	SS-20	10/31/96	soil
OES-SS-020-000-01-MSD	Matrix Spike Duplicate	SS-20 (OES-01)	10/31/96	soil
OES-SS-029-000-01-MS	Matrix Spike	SS-29	11/1/96	soil
OES-SS-029-000-01-MSD	Matrix Spike Duplicate	SS-29 (OES-02)	11/1/96	soil
OES-RB-001-XXX-01-RB	Rinsate Blank	OES-01	10/31/96	water
OES-RB-002-XXX-01-RB	Rinsate Blank	OES-02	11/1/96	water
OES-TB-001	Trip Blank	Sample Delivery Group OES-01	10/31/96	water
OES-TB-002	Trip Blank	Sample Delivery Group OES-02	11/1/96	water
OES-DW-001-XXX-01XX	Decontamination Fluid	- - -	11/1/96	water
Note: Refer to Appendix H for summary of analytical results. OES-01 - sampling delivery group designation				



Tentatively identified compounds detected above detection limits were also reported. Reporting limits varied from 10 to 23 ug/kg for individual samples. Variability was due to instrument response variation and matrix interference.

A total of eight VOCs were detected in at least one sample, as summarized in Table 4-2. Acetone was detected most frequently (23 of 37 samples). One VOC (toluene) was detected at a trace concentration [3 micrograms per kilogram (ug/kg)] in the background sample. Petroleum-related compounds (toluene, ethylbenzene, and xylenes) were detected in samples from several locations where the presence of organic compounds was noted during sampling efforts. Soil from locations SS-002, -013, and -034 had positive PID responses (i.e. greater than 5 ppm) during sampling and there was also a noticeable petroleum odor emanating from the excavated soils, and at location SS-002 a sheen was visible on the saturated soils taken from the excavation.

Concentrations of VOCs at 21 sample locations exceeded their respective background concentrations, but all were below their respective RBCs.

#### 4.2.2 Semivolatile Organic Compounds

Thirty-seven field samples, along with appropriate QC samples were submitted for SVOC analysis in accordance with USEPA CLP SOW OLM01.9 using gas chromatography/mass spectrometry (GC/MS) instrumentation. Samples were analyzed for 64 specific compounds. Tentatively identified compounds detected above detection limits were also reported. Reporting limits varied from 390 to 22,000 ug/kg for individual samples. Variability was again due to instrument response and sample matrix interference. Elevated reporting limits are common in SVOC analyses as a result of sample matrix interference.

A total of 23 SVOCs were detected in at least one sample, as summarized in Table 4-3. Most of the compounds detected are classified as polycyclic aromatic hydrocarbons (PAHs), which are by-products of combustion of organic materials. No SVOCs were detected above reporting limits in the background sample.

Concentrations of SVOCs at 9 sample locations exceeded their respective background concentrations, however, detected concentrations also exceeded their respective RBCs at only two of these locations, as indicated by the bold and shaded values on Table 4-3. These samples were collected from locations SS-001 and SS-002 (in the blind duplicate sample SS-035 only), as shown on Figure 4-2. All compounds of concern are PAHs.

*Why consider this sample location to exceed RBC? Organic sample did not exceed & duplicate was estimated concentrations*

~~Why consider this sample location to exceed RBC? Organic sample did not exceed & duplicate was estimated concentrations~~

~~Why consider this sample location to exceed RBC? Organic sample did not exceed & duplicate was estimated concentrations~~

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#### **4.2.3 Pesticides**

Thirty-seven field samples, along with appropriate QC samples were submitted for pesticide analysis in accordance with USEPA CLP SOW OLM01.9 using gas chromatography/mass spectrometry (GC/MS) instrumentation. Samples were analyzed for 21 specific compounds. Reporting limits varied from 1.9 to 3800 ug/kg for individual samples and compounds. Variability was due to instrument response and sample matrix interference. The laboratory reported the presence of two compounds, methoxychlor and dichlorodiphenyltrichloroethane (4,4'-DDT) in associated laboratory blanks for some of the samples collected. Potentially effected results are flagged with a "B" in Table 4-4. The laboratory also reported discrepancies outside QC limits in results between runs on two different columns for some compounds. Potentially effected results are flagged with a "P" in Table 4-4.

A total of 16 pesticide compounds were detected in at least one sample, as summarized in Table 4-4. Low concentrations of four compounds were detected above reporting limits in the background sample. These compounds were methoxychlor, dieldrin, 4,4'-DDT, and 4,4'-DDE, all common pesticides.

Concentrations of pesticides at 17 sample locations exceeded their respective background concentrations, however, none of the detected concentrations also exceeded their respective RBCs.

#### **4.2.4 Polychlorinated Biphenyls**

Thirty-seven field samples, along with appropriate QC samples were submitted for PCB analysis in accordance with USEPA CLP SOW OLM01.9 using gas chromatography/mass spectrometry (GC/MS) instrumentation. Samples were analyzed for seven specific PCB aroclors. Reporting limits varied from 39 to 1500 ug/kg for individual samples and compounds. Variability was due primarily to sample matrix interference. The laboratory reported that the results for several samples could not be confirmed by MS due to matrix interference problems. Potentially effected results are flagged with an "X" in Table 4-5. The laboratory also reported discrepancies outside QC limits in results between runs on two different columns for some compounds. Potentially effected results are flagged with a "P" in Table 4-5.

All seven aroclors were detected in at least one sample, as summarized in Table 4-5. No concentrations above reporting limits were detected in the background sample. Concentrations of PCBs at eight sample locations exceeded their respective background concentrations, however, the detected concentrations also exceeded their respective RBCs at only two locations, as indicated by the bold and shaded values in Table 4-5. These samples were collected from locations SS-001 and SS-027, as shown on Figure 4-2.

#### **4.2.5 Inorganics**

Thirty-seven field samples, along with appropriate QC samples were submitted for inorganics analysis in accordance with USEPA CLP SOW ILM02.1 using inductively-coupled plasma (ICP) spectrophotometry instrumentation. Samples were analyzed for 24 specific inorganic compounds. Reporting limits vary for individual inorganic species due primarily to instrument response and also sample matrix interference. Inorganic sample results have been qualified by the lab for several reasons including matrix interference and spike sample results outside control limits. Refer to the notes in Table 4-6 for a summary of data qualifier definitions.

All 24 inorganics were potentially detected in at least one sample, as summarized in Table 4-6. Concentrations above reporting limits of 14 inorganics were detected in the background sample. Because many inorganic compounds are naturally-occurring components of soil, the mere presence of these compounds does not necessarily indicate contamination. In general, the concentrations of inorganic compounds in the background sample were lower than the respective inorganic concentrations at any of the other sample locations.

Concentrations of only one inorganic compound (lead) exceeded both its background and screening values at a total of 12 locations, as indicated by the bold and shaded values in Table 4-6. These samples were collected from locations as shown on Figure 4-2. Because no RBC for lead has been reported, the value used (400 mg/kg) is from the Interim Guidance on Establishing Soil Lead Cleanup Levels at Superfund Sites (OSWER Directive 9355-4-12).

## **5.0 SUMMARY OF FINDINGS AND RECOMMENDATIONS**

The following is a summary of the key findings and conclusions of this ES, based on information obtained from records reviews, interviews with personnel knowledgeable in current and past site activities, visual inspection of the Subject Property and surrounding area, and the results of soil sampling and analysis. Recommendations for additional assessment activities, based on these findings, are also included.

- The Subject Property and adjoining properties have been classified as non-tidal wetland based on soil characteristics, plant species, and hydrologic conditions.
- There is an unnamed surface water feature that partially occupies the Subject Property. Groundwater is used for private water supplies from several wells within one mile of the Subject Property.
- Historic land use for the general vicinity of the Subject Property has been for limited agricultural development. No evidence was identified that indicates the Subject Property itself has been developed for agriculture, at least in the past 60 years.
- The Navy has owned the Subject Property and adjoining land to the north, south, and west of the site since the 1940s. The land was acquired to maintain a buffer zone around the air fields at NAS Oceana. There is no record or visual evidence of any development or applied use of the Subject Property by the Navy.
- The adjoining properties to the east of the Subject Property are currently operated as Oceana Salvage Yard. The salvage yard has been in operation at this location since approximately 1960. Prior to 1960, the salvage yard area was wooded and undeveloped.
- There is a potential land use change that may effect the Subject Property. The proposed route for the Southeast Parkway road project parallels Oceana Boulevard, between the boulevard and Oceana Salvage.
- There is visual evidence of encroachment onto Navy property by salvage yard operations. Encroachment is in the form of parked vehicles, a small smelter unit, a large boiler, and multiple accumulations of miscellaneous debris including scrap metal, rubber, glass, wood, white goods, furniture, tires, crushed battery casings, and other vehicle parts. Salvage yard operators have also excavated a drainage channel along the common boundary with Navy property.

- Review of air photos from several dates since 1966 document a pattern of encroachment onto Navy property by salvage yard operations, and possibly by others. Encroachment appears to consist of scrapped vehicles along the common boundary between the salvage yard and the Navy property, and vehicles and other unidentifiable materials along the wooded margins of the access road.
- Virginia Department of Environmental Quality has been pursuing response actions at Oceana Salvage since 1992. Citations have been made for operating an unlicensed battery reclamation facility, improper storage of tires, uncontained runoff of vehicle fluids from a car crushing operation on-site, and disposal of crushed battery casings and resulting lead contamination of soil on Navy property. Oceana Salvage has been addressing these issues in a limited fashion. The most significant action to date has been the removal of crushed battery casings and lead-contaminated soil from a small area of Navy property. The soil is currently being remediated using chemical stabilization techniques.
- According to salvage yard personnel, a large volume of crushed battery casings were brought to the salvage yard in the 1960s and used as fill material and road base. Despite the removal action conducted by Oceana Salvage, there is visual evidence of additional accumulations of battery casings along the south side of the access road.
- Results of soil sampling and analysis from both biased and unbiased locations across the Subject Property indicate that concentrations of lead, PCBs, and semivolatile PAHs exceed background and USEPA Region III RBC screening values for non-residential sites. (Screening criteria for lead was derived from cleanup guidance for Superfund sites.) No surface water or groundwater samples were collected as part of this investigation.

Based on the findings of this ES, as summarized above, ABB-ES concludes as follows.

- 1) Contamination of surface soil at the Subject Property has resulted from salvage yard operations, and potentially from waste disposal activities by others. Contaminants of concern are lead, PCBs, and PAHs. Evidence of petroleum-related contamination was also noted in one location. Concentrations of these compounds exceed site-specific background concentrations and USEPA Region III Risk-Based Concentration screening values or other USEPA screening values for the respective contaminants of concern.
- 2) Although areas of concern (based on the presence of contaminants at concentrations exceeding screening values) appear to be concentrated near the entrance to the salvage yard and the vicinity of crushed battery casings, the extent of surface soil contamination was not established by this survey.

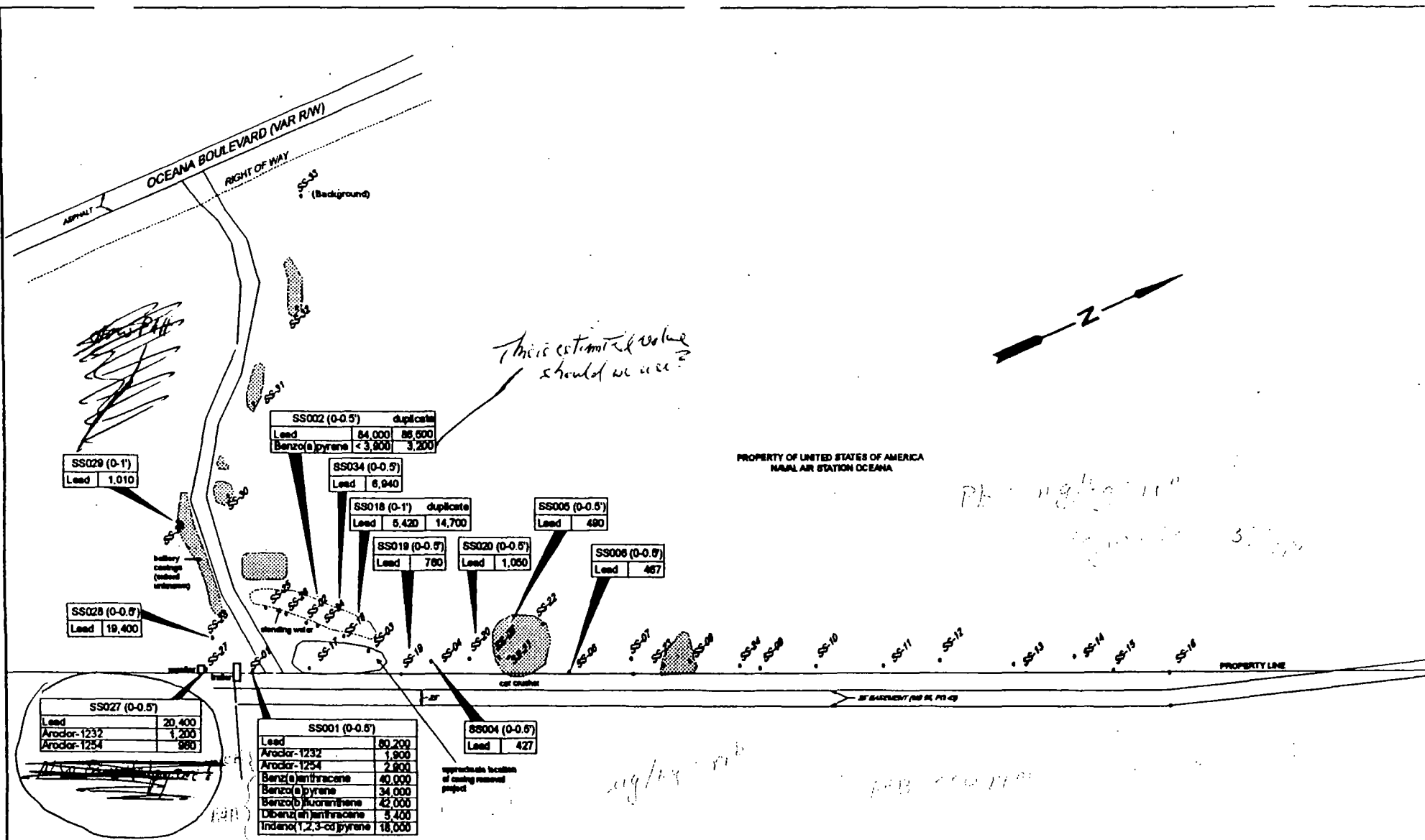
3) Both excavation and filling activities have occurred in wetland areas at the Subject Property over a period of time. Nearly all samples collected as part of this investigation were collected from wetland areas.

4) Given the shallow water table, the presence of surface water at the Subject Property, the persistent nature of the contaminants of concern, and the presence in surface soils of compounds such as toluene and acetone that are soluble, the potential exists for impact to surface water, sediment, and shallow groundwater from waste disposal activities at the Subject Property and adjoining properties.

Based on the findings and conclusions, as stated above, ABB-ES recommends the following Phase II activities.

- 1) Continue removal of remaining debris accumulations on Navy property to eliminate potential for future impact to the wetlands.
- 2) Consult with NAS Oceana legal counsel regarding notification of VDEQ of the findings of this investigation, either under the current RCRA Consent Order or under Clean Water Act reporting requirements.
- 3) Evaluate the nature of potential contamination in groundwater, surface water, and sediment at the Subject Property by conducting Phase II sampling and analysis activities.
- 4) Install at least three groundwater monitoring points so that a determination of groundwater flow direction at the Subject Property may be made.
- 5) Continue to monitor the progress and results of environmental remediation activities at Oceana Salvage Yard.
- 6) Based on the expressed concern of VDEQ regarding the remediation of crushed battery casings, make a qualitative evaluation of the extent of crushed casings present along the south side of the access road.

Specific recommendations for Phase II activities will be provided at the Client's request.



• Areas of significant surface debris • SS-16 Sample location

**NOTES:**

1. Concentrations are reported in milligrams per kilogram for lead, and micrograms per kilogram for all other compounds.
2. Values reported exceed USEPA Region III Risk Based Concentrations for Ingestion of Soil at an Industrial site. RBC for lead is not available, value is Interim Guidance on Establishing Soil Lead Cleanup Levels at Superfund Sites (OSWER directive 9355-4-12).

SCALE IN FEET 0 100 200



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**FIGURE 4-2**  
**Areas of Environmental Concern**  
**Property Adjacent to Oceana Salvage**  
**NAS Oceana, Virginia Beach, VA**

**Table 4-2**  
**Summary of Positive Detections - Volatiles**

Environmental Survey  
Property Adjacent to Oceana Salvage Yard  
Naval Air Station Oceana  
Virginia Beach, VA

Sample ID	Background (SS033)	RBC for Industrial Soil (mg/kg)	SS001	SS002	SS035 (SS002DUP)	SS003	SS004	SS006	SS006RE	SS007	SS009
Lab ID	C6L69		C6L5X	C6L5W	C6L5V	C6L5M	C6L56	C6L51	C6L51RE	C6L4X	C6L4P
Sampling Date	11/1/96		11/1/96	11/1/96	11/1/96	11/1/96	10/31/96	10/31/96	10/31/96	10/31/96	10/31/96
Depth, ft b/s	0-0.5		0-0.5	0-0.5	0-0.5	1-2	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Volatiles, ug/kg											
2-Butanone	12 U	1,000,000									
Acetone	12 U	200,000	39	24		24	14	28	12 J	36	11 J
Carbon disulfide	12 U	200,000									
Chloromethane	12 U	440						4 J			
Ethylbenzene	12 U	200,000			3 J						
Methylene chloride	12 U	760	3 J								
Toluene	3 J	410,000	8 J	10 J	6 J	5 J		5 J			
Xylenes (total)	12 U	1,000,000			23						
See notes at end of table.											



Table 4-2 (continued)  
Summary of Positive Detections - Volatiles

Environmental Survey  
Property Adjacent to Oceana Salvage Yard  
Naval Air Station Oceana  
Virginia Beach, VA

Sample ID	Background (SS033)	RBC for Industrial Soil (mg/kg)	SS011	SS012	SS013	SS013RE	SS014	SS016RE	SS017	SS018
Lab ID	C6L69		C6L4N	C6L4M	C6L4L	C6L4LRE	C6L4K	C6L4HRE	C6L5T	C6L5Q
Sampling Date	11/1/96		10/31/96	10/31/96	10/31/96	10/31/96	10/31/96	10/31/96	11/1/96	11/1/96
Depth, ft bis	0-0.5		0-0.5	0-0.5	0-1	0-1	0-0.5	0-0.5	0-0.5	0-1
Volatiles, ug/kg										
2-Butanone	12 U	1,000,000		17 J						19
Acetone	12 U	200,000		23	12 J	12 J	21	17		95
Carbon disulfide	12 U	200,000								
Chloromethane	12 U	440								
Ethylbenzene	12 U	200,000								
Methylene chloride	12 U	760								
Toluene	3 J	410,000	4 J	6 J		10 J		17	4 J	54
Xylenes (total)	12 U	1,000,000								
See notes at end of table.										

**Table 4-2 (continued)**  
**Summary of Positive Detections - Volatiles**

Environmental Survey  
Property Adjacent to Oceana Salvage Yard  
Naval Air Station Oceana  
Virginia Beach, VA

Sample ID	Background (SS033)	RBC for Industrial Soil (mg/kg)	SS037 (SS018DUP)	SS019	SS019RE	SS020	SS022	SS022RE	SS023	SS023RE
Lab ID	C6L69		C6L5R	C6L57	C6L57RE	C6L5A	C6L50	C6L50RE	C6L4W	C6L4WRE
Sampling Date	11/1/96		11/1/96	10/31/96	10/31/96	10/31/96	10/31/96	10/31/96	10/31/96	10/31/96
Depth, ft bis	0-0.5		0-1	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Volatiles, ug/kg										
2-Butanone	12 U	1,000,000	19							
Acetone	12 U	200,000	98					29		100
Carbon disulfide	12 U	200,000								
Chloromethane	12 U	440								
Ethylbenzene	12 U	200,000				3 J	5 J	12 J		
Methylene chloride	12 U	760	4 J							
Toluene	3 J	410,000	60	4 J	4 J		15 J	57	19	16
Xylenes (total)	12 U	1,000,000				7 J				

See notes at end of table.

**Table 4-2 (continued)**  
**Summary of Positive Detections - Volatiles**

Environmental Survey  
Property Adjacent to Oceana Salvage Yard  
Naval Air Station Oceana  
Virginia Beach, VA

Sample ID	Background (SS033)	RBC for Industrial Soil (mg/kg)	SS024	SS024RE	SS025	SS026	SS027	SS028	SS030	SS031
Lab ID	C6L69		C6L4R	C6L4RRE	C6L60	C6L61	C6L62	C6L63	C6L66	C6L67
Sampling Date	11/1/96		10/31/96	10/31/96	11/1/96	11/1/96	11/1/96	11/1/96	11/1/96	11/1/96
Depth, ft bis	0-0.5		0-0.5	0-0.5	0-0.5	3-4	0-0.5	0-0.5	0-0.5	0-1
Volatiles, ug/kg										
2-Butanone	12 U	1,000,000	16 J		13					
Acetone	12 U	200,000	37	12 J	62	44				
Carbon disulfide	12 U	200,000				15				
Chloromethane	12 U	440	4 J							
Ethylbenzene	12 U	200,000								
Methylene chloride	12 U	760			4 J		3 J		3 J	2 J
Toluene	3 J	410,000		6 J		4 J	2 J	24	10 J	3 J
Xylenes (total)	12 U	1,000,000			13					
See notes at end of table.										

Table 4-z (continued)  
Summary of Positive Detections - Volatiles

Environmental Survey  
Property Adjacent to Oceana Salvage Yard  
Naval Air Station Oceana  
Virginia Beach, VA

Sample ID	Background (SS033)	RBC for Industrial Soil (mg/kg)	SS032	SS034
Lab ID	C6L69		C6L68	C6L6A
Sampling Date	11/1/96		11/1/96	11/1/96
Depth, ft b/s	0-0.5		0-0.5	0-0.5
Volatiles, ug/kg				
2-Butanone	12 U	1,000,000		
Acetone	12 U	200,000		
Carbon disulfide	12 U	200,000		
Chloromethane	12 U	440		
Ethylbenzene	12 U	200,000		
Methylene chloride	12 U	760		
Toluene	3 J	410,000	3 J	6 J
Xylenes (total)	12 U	1,000,000		
See notes at end of table.				

Table 4-2 (continued)  
Summary of Positive Detections - Volatiles

Environmental Survey  
Property Adjacent to Oceana Salvage Yard  
Naval Air Station Oceana  
Virginia Beach, VA

NOTES:

<sup>1</sup>RBC = Risk Based Concentration Table, USEPA Region III, May 1996, R.L. Smith.

\* = RBC for surrogate compound or class of compounds (e.g., PCBs)

<sup>2</sup>All samples received by laboratory on 11/2/96. Refer to Figure 4-2 for sample locations.

feet bls = feet below land surface

mg/kg = milligrams per kilogram

ug/kg = micrograms per kilogram

DUP = duplicate sample

J = associated value is estimated (below contract required quantitation limit)

U = material was analyzed for, but not detected above reported sample quantitation limit.

NR = not reported

RE = sample reextracted and reanalyzed due to matrix interference

All organics in micrograms per kilograms (ug/kg) soil dry weight.

Bold/shaded values indicate exceedance of regulatory guidance and background.

Blank space indicates analyte/compound was not detected at the reporting limit.

**Table 4-3**  
**Summary of Positive Detections - Semivolatiles**

Environmental Survey  
Property Adjacent to Oceana Salvage Yard  
Naval Air Station Oceana  
Virginia Beach, VA

Sample ID	Background (SS033)	RBC for Industrial Soil (mg/kg)	SS001	SS002	SS035 (SS002DUP)	SS004	SS006	SS010	SS010RE	SS015
Lab ID	C6L69		C6L5X	C6L5W	C6L5V	C6L56	C6L51	C6L5D	C6L5DRE	C6L4J
Sampling Date	11/1/96		11/1/96	11/1/96	11/1/96	10/31/96	10/31/96	10/31/96	10/31/96	10/31/96
Depth, ft bls	0-0.5		0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
<b>Semivolatiles, ug/kg</b>										
2-Methylnaphthalene	410 U	NR	1,400 J	710 J	700 J					
4-Methylphenol (p-cresol)	410 U	10,000								
Acenaphthene	410 U	120,000	4,300 J							
Anthracene	410 U	610,000	11,000	540 J	640 J					
Benz[a]anthracene	410 U	7.8	40,000	1,900 J	3,400 J	460 J		57 J		
Benzo(g,h,i)perylene	410 U	NR	17,000		1,500 J	290 J			54 J	
Benzo[a]pyrene	410 U	0.78	34,000		3,200 J	450 J				
Benzo[b]fluoranthene	410 U	7.8	42,000	2,000 J	3,800 J	570 J				
Benzo[k]fluoranthene	410 U	78	14,000	690 J	1,100 J	280 J				
Bis(2-ethylhexyl)phthalate (BEHP)	410 U	410	14,000	2,700 J	13,000	1,100 J	220 J	360 J	1,000	61 J
Butyl benzyl phthalate	410 U	410,000							260 J	
Carbazole	410 U	290	3,800 J							
Chrysene	410 U	780	36,000	2,300 J	3,600 J	500 J		48 J	52 J	
di-n-Octyl phthalate	410 U	41,000								
Dibenz[ah]anthracene	410 U	0.78	5,400 J							
Dibenzofuran	410 U	8,200	2,300 J							
Dibutyl phthalate	410 U	200,000						62 J		
Fluoranthene	410 U	82,000	69,000	3,100 J	5,500	750 J			68 J	
Fluorene	410 U	82,000	3,900 J							
Indeno[1,2,3-cd]pyrene	410 U	7.8	10,000	650 J	1,400 J	220 J				
Naphthalene	410 U	82,000	3,300 J	860 J	810 J					
Pentachlorophenol	1,000 U	48							58 J	
Phenanthrene	410 U	NR	52,000	2,700 J	2,900 J	380 J				
Pyrene	410 U	61,000	61,000	2,800 J	4,800	630 J		51 J	94 J	
See notes at end of table.										

Table 4-3 (continued)  
Summary of Positive Detections - Semivolatiles

Environmental Survey  
Property Adjacent to Oceana Salvage Yard  
Naval Air Station Oceana  
Virginia Beach, VA

Sample ID	Background (SS033)	RBC for Industrial Soil (mg/kg)	SS017	SS018	SS037 (SS018DUP)	SS020	SS022	SS023	SS024	SS027
Lab ID	C6L69		C6L5T	C6L5Q	C6L5R	C6L5A	C6L50	C6L4W	C6L4R	C6L62
Sampling Date	11/1/96		11/1/96	11/1/96	11/1/96	10/31/96	10/31/96	10/31/96	10/31/96	11/1/96
Depth, ft b/s	0-0.5		0-0.5	0-1	0-1	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
<b>Semivolatiles, ug/kg</b>										
2-Methylnaphthalene	410 U	NR								
4-Methylphenol (p-cresol)	410 U	10,000		140 J	110 J					
Acenaphthene	410 U	120,000								
Anthracene	410 U	610,000								67 J
Benz[a]anthracene	410 U	7.8	54 J			88 J			120 J	460
Benzo(g,h,i)perylene	410 U	NR							86 J	280 J
Benzo[a]pyrene	410 U	0.78				90 J			130 J	560
Benzo[b]fluoranthene	410 U	7.8	77 J			130 J		56 J	190 J	650
Benzo[k]fluoranthene	410 U	78	44 J			50 J				180 J
Bis(2-ethylhexyl)phthalate (BEHP)	410 U	410	41 J	6,700	700	330 JB	90 J	800	370 J	200 J
Butyl benzyl phthalate	410 U	410,000		380 J						120 J
Carbazole	410 U	290								
Chrysene	410 U	780	59 J		45 J	98 J			130 J	440
di-n-Octyl phthalate	410 U	41,000		560 J						
Dibenz[ah]anthracene	410 U	0.78								
Dibenzofuran	410 U	8,200								
Dibutyl phthalate	410 U	200,000				260 J		820	57 J	
Fluoranthene	410 U	82,000	64 J	130 J	100 J	170 J		69 J	200 J	710
Fluorene	410 U	82,000								
Indeno[1,2,3-cd]pyrene	410 U	7.8	39 J						95 J	280 J
Naphthalene	410 U	82,000								
Pentachlorophenol	1,000 U	48								
Phenanthrene	410 U	NR			130 J	59 J			120 J	320 J
Pyrene	410 U	61,000	82 J		68 J	130 J			200 J	700
See notes at end of table.										

Table 4-3 (continued)  
Summary of Positive Detections - Semivolatiles

Environmental Survey  
Property Adjacent to Oceana Salvage Yard  
Naval Air Station Oceana  
Virginia Beach, VA

Sample ID	Background (SS033)	RBC for Industrial Soil (mg/kg)	SS027RE	SS028	SS034
Lab ID	C6L69		C6L62RE	C6L63	C6L6A
Sampling Date	11/1/96		11/1/96	11/1/96	11/1/96
Depth, ft b/s	0-0.5		0-0.5	0-0.5	0-0.5
Semivolatiles, ug/kg					
2-Methylnaphthalene	410 U	NR			
4-Methylphenol (p-cresol)	410 U	10,000			
Acenaphthene	410 U	120,000	170 J		
Anthracene	410 U	610,000	460 J		
Benz[a]anthracene	410 U	7.8	2,400	600 J	60 J
Benzo(g,h,i)perylene	410 U	NR	1,200		
Benzo[a]pyrene	410 U	0.78	2,000	620 J	66 J
Benzo[b]fluoranthene	410 U	7.8	2,700	740 J	
Benzo[k]fluoranthene	410 U	78	560 J	350 J	
Bis(2-ethylhexyl)phthalate (BEHP)	410 U	410	4,100	2,700	240 J
Butyl benzyl phthalate	410 U	410,000	500 J		
Carbazole	410 U	290	190 J		
Chrysene	410 U	780	2,100	640 J	80 J
di-n-Octyl phthalate	410 U	41,000			
Dibenz[ah]anthracene	410 U	0.78	220 J		
Dibenzofuran	410 U	8,200			
Dibutyl phthalate	410 U	200,000			
Fluoranthene	410 U	82,000	5,000	900 J	82 J
Fluorene	410 U	82,000			
Indeno(1,2,3-cd)pyrene	410 U	7.8	1,000	500 J	
Naphthalene	410 U	82,000			
Pentachlorophenol	1,000 U	48			
Phenanthrene	410 U	NR	2,100	470 J	59 J
Pyrene	410 U	61,000	2,800	790 J	87 J
See notes at end of table.					



Table 4-3 (continued)  
Summary of Positive Detections - Semivolatiles

Environmental Survey  
Property Adjacent to Oceana Salvage Yard  
Naval Air Station Oceana  
Virginia Beach, VA

NOTES:

<sup>1</sup>RBC = Risk Based Concentration Table, USEPA Region III, May 1996, R.L. Smith. RBC for benzo(g,h,i)perylene and phenanthrene are not available, value is based on pyrene.

<sup>2</sup>All samples received by laboratory on 11/2/96. Refer to Figure 4-2 for sample locations.

feet bls = feet below land surface

mg/kg = milligrams per kilogram

ug/kg = micrograms per kilogram

B = analyte also found in associated blank

DUP = duplicate sample

J = associated value is estimated (below contract required quantitation limit)

U = material was analyzed for, but not detected above reported sample quantitation limit.

NR = not reported

RE = sample reextracted and reanalyzed due to matrix interference

All organics in micrograms per kilograms (ug/kg) soil dry weight.

Bold/shaded values indicate exceedance of regulatory guidance and background.

Blank space indicates analyte/compound was not detected at the reporting limit.

**Table 4-4**  
**Summary of Positive Detections - Pesticides**

Environmental Survey  
Property Adjacent to Oceana Salvage Yard  
Naval Air Station Oceana  
Virginia Beach, VA

Sample ID	Background (SS033)	RBC for Industrial Soil (mg/kg)	SS001	SS002	SS035 (SS002DUP)	SS003	SS004	SS005	SS006	SS007	SS009
Lab ID	C6L69		C6L5X	C6L5W	C6L5V	C6L5M	C6L56	C6L55	C6L51	C6L4X	C6L4P
Sampling Date	11/1/96		11/1/96	11/1/96	11/1/96	11/1/96	10/31/96	10/31/96	10/31/96	10/31/96	10/31/96
Depth, ft b/s	0-0.5		0-0.5	0-0.5	0-0.5	1-2	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
<b>Pesticides, ug/kg</b>											
Aldrin	2.1 U	0.34									
alpha-BHC	2.1 U	0.91									
delta-BHC	2.1 U	3.2*									
gamma-BHC (Lindane)	2.1 U	4.4									
alpha-Chlordane	2.1 U	4.4*	120	14 P	19 P		49 P		0.79 JP		0.78 J
gamma-Chlordane	2.1 U	4.4*		3.2 JP	4.2 JP		61		0.59 JP		1.2 JP
4,4'-DDD	4.2 U	24					26	0.61 JP			0.43 J
4,4'-DDE	0.89 JP	17	56 JP				1 JP	0.65 JP	0.48 JP	1.8 J	0.39 JP
4,4'-DDT	2 JBP	17	85 BP								0.76 JP
Dieldrin	0.34 J	0.36					1.5 JP	1.6 J	0.91 JP	0.29 JP	
Endosulfan I	2.1 U	12,000*	45 P	4.4 P	11 P						
Endrin	4.2 U	610									
Endrin aldehyde	4.2 U	NR			13 JP						
Endrin ketone	4.2 U	NR							0.15 JP	0.78 JP	
Heptachlor epoxide	2.1 U	0.63					1.9 JP				
Methoxychlor	6.6 JBP	10,000				0.6 JBP					
See notes at end of table.											

**Table 4-4 (continued)**  
**Summary of Positive Detections - Pesticides**

Environmental Survey  
Property Adjacent to Oceana Salvage Yard  
Naval Air Station Oceana  
Virginia Beach, VA

Sample ID	Background (SS033)	RBC for Industrial Soil (mg/kg)	SS010	SS011	SS016	SS017	SS018	SS037 (SS018DUP)	SS019	SS020	SS021
Lab ID	C6L69		C6L5D	C6L4N	C6L4H	C6L5T	C6L5Q	C6L5R	C6L57	C6L5A	C6L53
Sampling Date	11/1/96		10/31/96	10/31/96	10/31/96	11/1/96	11/1/96	11/1/96	10/31/96	10/31/96	10/31/96
Depth, ft bls	0-0.5		0-0.5	0-0.5	0-0.5	0-0.5	0-1	0-1	0-0.5	0-0.5	0-0.5
Pesticides, ug/kg											
Aldrin	2.1 U	0.34	0.85 JP	0.41 JP							
alpha-BHC	2.1 U	0.91									
delta-BHC	2.1 U	3.2*									
gamma-BHC (Lindane)	2.1 U	4.4									
alpha-Chlordane	2.1 U	4.4*	1.1 J			0.41 JP	2.2 P	3 JP	3.8 JP	18 P	
gamma-Chlordane	2.1 U	4.4*	2 JP			0.16 JP	0.87 JP	1 JP	2.5 JP	22	
4,4'-DDD	4.2 U	24				0.5 JP				4.9 P	
4,4'-DDE	0.89 JP	17	0.43 J		0.31 J	0.44 J	0.6 JP	0.82 JP		0.4 JP	0.24 J
4,4'-DDT	2 JBP	17									0.36 JP
Dieldrin	0.34 J	0.36	1.8 J	0.3 J						3.9 J	
Endosulfan I	2.1 U	12,000*				0.16 JP	1.5 JP	1.3 JP	10 J		
Endrin	4.2 U	610					3.5 JP				
Endrin aldehyde	4.2 U	NR									
Endrin ketone	4.2 U	NR									
Heptachlor epoxide	2.1 U	0.63					1.3 JP	4.3 JP		0.29 JP	
Methoxychlor	6.6 JBP	10,000				1.6 JBP			36 JP		
See notes at end of table.											

**Table 4-4 (continued)**  
**Summary of Positive Detections - Pesticides**

Environmental Survey  
Property Adjacent to Oceana Salvage Yard  
Naval Air Station Oceana  
Virginia Beach, VA

Sample ID	Background (SS033)	RBC for Industrial Soil (mg/kg)	SS022	SS023	SS024	SS025	SS026	SS027	SS028	SS029	SS031
Lab ID	C6L69		C6L50	C6L4W	C6L4R	C6L60	C6L61	C6L62	C6L63	C6L65	C6L67
Sampling Date	11/1/96		10/31/96	10/31/96	10/31/96	11/1/96	11/1/96	11/1/96	11/1/96	11/1/96	11/1/96
Depth, ft bis	0-0.5		0-0.5	0-0.5	0-0.5	0-0.5	3-4	0-0.5	0-0.5	0-1	0-1
Pesticides, ug/kg											
Aldrin	2.1 U	0.34		1.8 JP							
alpha-BHC	2.1 U	0.91							0.69 JP		
delta-BHC	2.1 U	3.2*		0.81 JP							
gamma-BHC (Lindane)	2.1 U	4.4									
alpha-Chlordane	2.1 U	4.4*		3.2	0.78 J			39	3.8 P		0.46 J
gamma-Chlordane	2.1 U	4.4*		3 P	0.24 JP			14 JP	3.3 P		0.39 J
4,4'-DDD	4.2 U	24		0.75 JP				100 P	49		
4,4'-DDE	0.89 JP	17	0.62 J	1.8 JP	0.47 J	0.25 JP		26 J	6.9 P		
4,4'-DDT	2 JBP	17		2.5 JP			0.24 JB	120 B	18 BP		
Dieldrin	0.34 J	0.36		2.4 J	0.73 J						0.7 J
Endosulfan I	2.1 U	12,000*						23 JP	3 P		
Endrin	4.2 U	610									
Endrin aldehyde	4.2 U	NR									
Endrin ketone	4.2 U	NR									
Heptachlor epoxide	2.1 U	0.63		4.5							
Methoxychlor	6.6 JBP	10,000					1.3 JB			2.2 JB	1.2 JBP

See notes at end of table.

**Table 4-4 (continued)**  
**Summary of Positive Detections - Pesticides**

Environmental Survey  
Property Adjacent to Oceana Salvage Yard  
Naval Air Station Oceana  
Virginia Beach, VA

Sample ID	Background (SS033)	RBC for Industrial Soil (mg/kg)	SS032	SS034
Lab ID	C6L69		C6L68	C6L6A
Sampling Date	11/1/96		11/1/96	11/1/96
Depth, ft b/s	0-0.5		0-0.5	0-0.5
Pesticides, ug/kg				
Aldrin	2.1 U	0.34		
alpha-BHC	2.1 U	0.91		0.28 JP
delta-BHC	2.1 U	3.2*		
gamma-BHC (Lindane)	2.1 U	4.4		
alpha-Chlordane	2.1 U	4.4*		11
gamma-Chlordane	2.1 U	4.4*		6.2 P
4,4'-DDD	4.2 U	24		9.9
4,4'-DDE	0.89 JP	17	2 J	6.4 P
4,4'-DDT	2 JBP	17	1.5 JB	4.3 B
Dieldrin	0.34 J	0.36		
Endosulfan I	2.1 U	12,000*		2.1 P
Endrin	4.2 U	610		2.6 JP
Endrin aldehyde	4.2 U	NR		
Endrin ketone	4.2 U	NR		0.11 JP
Heptachlor epoxide	2.1 U	0.63		5.5 P
Methoxychlor	6.6 JBP	10,000		
See notes at end of table.				

Table 4-4 (continued)  
Summary of Positive Detections - Pesticides

Environmental Survey  
Property Adjacent to Oceana Salvage Yard  
Naval Air Station Oceana  
Virginia Beach, VA

NOTES:

<sup>1</sup>RBC = Risk Based Concentration Table, USEPA Region III, May 1996, R.L. Smith.

\* = RBC for surrogate compound or class of compounds (e.g., PCBs)

<sup>2</sup>All samples received by laboratory on 11/2/96. Refer to Figure 4-2 for sample locations.

feet bls = feet below land surface

mg/kg = milligrams per kilogram

ug/kg = micrograms per kilogram

DDD = Dichlorodiphenyldichloroethane

DDE = Dichlorodiphenyldichloroethene

DDT = Dichlorodiphenyltrichloroethane

B = analyte also found in associated blank

DUP = duplicate sample

J = associated value is estimated (below contract required quantitation limit)

P = greater than 25% difference between the results run on two columns - lower result reported

U = material was analyzed for, but not detected above reported sample quantitation limit.

NR = not reported

RE = sample reextracted and reanalyzed due to matrix interference

All organics in micrograms per kilograms (ug/kg) soil dry weight.

Bold/shaded values indicate exceedance of regulatory guidance and background.

Blank space indicates analyte/compound was not detected at the reporting limit.

**Table 4-5**  
**Summary of Positive Detections - Polychlorinated Biphenyls**

Environmental Survey  
Property Adjacent to Oceana Salvage Yard  
Naval Air Station Oceana  
Virginia Beach, VA

Sample ID	Background (SS033)	RBC for Industrial Soil (mg/kg)	SS001	SS002	SS035 (SS002DUP)	SS006	SS018	SS037 (SS018DUP)	SS019	SS020	SS024
Lab ID	C6L69		C6L5X	C6L5W	C6L5V	C6L5I	C6L5Q	C6L5R	C6L57	C6L5A	C6L4R
Sampling Date	11/1/96		11/1/96	11/1/96	11/1/96	10/31/96	11/1/96	11/1/96	10/31/96	10/31/96	10/31/96
Depth, ft bis	0-0.5		0-0.5	0-0.5	0-0.5	0-0.5	0-1	0-1	0-0.5	0-0.5	0-0.5
PCBs, ug/kg											
Aroclor-1016	42 U	140	770 U		410						
Aroclor-1221	83 U	0.74*	1,500 U**	430	700		53 JP				
Aroclor-1232	42 U	0.74*	1,900 XP		640 P						
Aroclor-1242	42 U	0.74*	770 U**		350 P						
Aroclor-1248	42 U	41	770 U		950 P		150 P	210 JP	490 XP		
Aroclor-1254	42 U	0.74*	2,900 X		670	16 JP	57 P	130 JP		45	13 JP
Aroclor-1260	42 U	0.74*	770 U**			28 J	54 P		560 X	24 JP	
See notes at end of table.											

Table 4-5 (continued)  
Summary of Positive Detections - Polychlorinated Biphenyls

Environmental Survey  
Property Adjacent to Oceana Salvage Yard  
Naval Air Station Oceana  
Virginia Beach, VA

Sample ID	Background (SS033)	RBC for Industrial Soil (mg/kg)	SS027	SS028	SS034
Lab ID	C6L69		C6L62	C6L63	C6L6A
Sampling Date	11/1/96		11/1/96	11/1/96	11/1/96
Depth, ft bis	0-0.5		0-0.5	0-0.5	0-0.5
PCBs, ug/kg					
Aroclor-1016	42 U	140	630 J		
Aroclor-1221	83 U	0.74*	1,500 U**	64 J	
Aroclor-1232	42 U	0.74*	1,200 X		
Aroclor-1242	42 U	0.74*	760 U**		
Aroclor-1248	42 U	41	760 U		160
Aroclor-1254	42 U	0.74*	960 XP		90
Aroclor-1260	42 U	0.74*	760 U**		57 P
See notes at end of table.					



Table 4-5 (continued)  
Summary of Positive Detections - Polychlorinated Biphenyls

Environmental Survey  
Property Adjacent to Oceana Salvage Yard  
Naval Air Station Oceana  
Virginia Beach, VA

NOTES:

<sup>1</sup>RBC = Risk Based Concentration Table, USEPA Region III, May 1996, R.L. Smith.

\* = RBC for surrogate compound or class of compounds (e.g., PCBs)

<sup>2</sup>All samples received by laboratory on 11/2/96. Refer to Figure 4-2 for sample locations.

feet b/s = feet below land surface

PCB = polychlorinated biphenyl

mg/kg = milligrams per kilogram

ug/kg = micrograms per kilogram

DUP = duplicate sample

J = associated value is estimated (below contract required quantitation limit)

P = greater than 25% difference between the results run on two columns - lower result reported

U = material was analyzed for, but not detected above reported sample quantitation limit.

X = compound could not be confirmed by gas chromatograph/mass spectrometry due to matrix interference

NR = not reported

RE = sample reextracted and reanalyzed due to matrix interference

All organics in micrograms per kilograms (ug/kg) soil dry weight.

Bold/shaded values indicate exceedance of regulatory guidance and background.

Blank space indicates analyte/compound was not detected at the reporting limit.

**Table 4-6**  
**Summary of Positive Detections - Inorganics**

Environmental Survey  
Property Adjacent to Oceana Salvage Yard  
Naval Air Station Oceana  
Virginia Beach, VA

Sample ID	Background (SS033)	RBC for Industrial Soil (mg/kg)	SS001	SS002	SS035 (SS002DUP)	SS003	SS004	SS005	SS006
Lab ID	C6L69		C6L5X	C6L5W	C6L5V	C6L5M	C6L56	C6L55	C6L51
Sampling Date	11/1/96		11/1/96	11/1/96	11/1/96	11/1/96	10/31/96	10/31/96	10/31/96
Depth, ft bls	0-0.5		0-0.5	0-0.5	0-0.5	1-2	0-0.5	0-0.5	0-0.5
Inorganics, mg/kg									
Aluminum	5,650	1,000,000	2,430	4,850	6,480	16,000	10,500	11,800	7,930
Antimony	0.75 UN	820	465 N	103 N	199 N	0.77 UN	1.9 BN	1.5 BN	2.4 BN
Arsenic	1.2 B	3.8 c/610 n	42.1	46.2	47.8	2.2 B	3.7 *	2.3 B*	4.8 *
Barium	13 B	140,000	105	98.8	120	65.8	52.8	79.5	49.2 B
Beryllium	0.25 U	1.3							
Cadmium	0.25 U	1,000	3.1	1.9	2.8		0.28 B	0.35 B	1.3 B
Calcium	254 BE	1,000,000	5,720 E	5,830 E	6,030 E	876 BE	5,460 *	5,070 *	4,520 *
Chromium	4	10,000	13	20.2	29.6	17.5	19.6	13.3	16.2
Cobalt	0.5 U	120,000	1.4 B	2.7 B	2.7 B	2.4 B	3.4 B	2.1 B	1.7 B
Copper	2.3 B	82,000	1,450	278	391	8.1	30.9	161	48.3
Iron	3,330	610,000	20,500	20,000	21,600	4,630	9,610 *	4,940 *	10,000 *
Lead	18.9 *	400	80,208 *	84,088 *	88,560 *	20 *	427 *	480 *	547 *
Magnesium	272 B	460,468	382 B	769 B	671 B	746 B	1,580	2,800	697 B
Manganese	9.2	47,000	32.3	81.9	68.4	14.3	92.1 EN	51.4 EN*	84 EN*
Mercury	0.06 U	610	1.1	0.13	0.24		0.08 B	0.14 B	0.12 B
Nickel	2 B	41,000	11.8	23.5	28.6	7.9 B	12.4	7.3 B	13.7
Potassium	104 B	NR	268 B	333 B	358 B	517 B	1,020 B	594 B	419 B
Selenium	0.75 U	10,000	1.6	0.93 B	0.92 B				
Silver	0.25 U	10,000	10.1	1.4 B	1.2 B				2.8 B
Sodium	31.40 U	NR	222 B	229 B	35.6 B	239 B	60.7 B	74.8 B	67.3 B
Thallium	1.5 U	0	2.8	2.9	3.3				
Vanadium	7.9 B	14,000	19.3	26.5	24.3	17.4	37.6	17.6	22.9
Zinc	8.3	10,000	238	350	328	28.8	89.7	344	276
Cyanide	0.18 U	41,000		0.17 B			0.17 UN	0.22 UN	0.23 UN

See notes at end of table.

Table 4-6 (continued)  
Summary of Positive Detections - Inorganics

Environmental Survey  
Property Adjacent to Oceana Salvage Yard  
Naval Air Station Oceana  
Virginia Beach, VA

Sample ID	Background (SS033)	RBC for Industrial Soil (mg/kg)	SS007	SS008	SS036 (SS008DUP)	SS009	SS010	SS011	SS012
Lab ID	C6L69		C6L4X	C6L4T	C6L4V	C6L4P	C6L5D	C6L4N	C6L4M
Sampling Date	11/1/96		10/31/96	10/31/96	10/31/96	10/31/96	10/31/96	10/31/96	10/31/96
Depth, ft b/s	0-0.5		0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Inorganics, mg/kg									
Aluminum	5,650	1,000,000	11,400	13,500	12,900	11,800	8,600	17,000	17,700
Antimony	0.75 UN	820	1.5 BN	0.87 UN	0.79 UN	0.85 UN	1.5 BN	1.1 UN	1.2 UN
Arsenic	1.2 B	3.8 c/610 n	1.4 B*	1.4 B*	1.6 B*	2.7 B*	3.2 *	1.7 B*	2.1 B*
Barium	13 B	140,000	42.2 B	52.8 B	50.1 B	60.1	50.7 B	54.6 B	72.7 B
Beryllium	0.25 U	1.3							
Cadmium	0.25 U	1,000					0.71 B		
Calcium	254 BE	1,000,000	2,540 *	217 B*	216 B*	781 B*	23,500 *	911 B*	1,120 B*
Chromium	4	10,000	11.7	11.4	11.2	17.8	16.6	17.6	17.4
Cobalt	0.5 U	120,000	1.9 B	1.2 B	1.1 B	2.8 B	2.6 B	1.9 B	1.5 B
Copper	2.3 B	82,000	8.6 B	1.7 B	1.8 B	8.00	17.4	6.8 B	7.4 B
Iron	3,330	610,000	3,910 *	2,740 *	2,730 *	5,630 *	7,520 *	3,150 *	2,860 *
Lead	18.9 *	400	57 *	10.60 *	10.8 *	19 *	232 *	17.2 *	19.9 *
Magnesium	272 B	460,468	796 B	379 B	419 B	991 B	1,800	684 B	608 B
Manganese	9.2	47,000	31.8 EN*	5.7 EN*	5.9 EN*	25.7 EN*	118 EN*	9.6 EN	9.8 EN*
Mercury	0.06 U	610		0.13 B	0.1 B		0.08 B	0.13 B	0.15 B
Nickel	2 B	41,000	7.6 B	4.1 B	4.5 B	8.4 B	13.3	7.4 B	7 B
Potassium	104 B	NR	571 B	224 B	219 B	615 B	763 B	594 B	433 B
Selenium	0.75 U	10,000							
Silver	0.25 U	10,000							
Sodium	31.40 U	NR	82.8 B	79.6 B	44.5 B	64.6 B	110 B	79.9 B	60.4 B
Thallium	1.5 U	0							
Vanadium	7.9 B	14,000	16.7 B	15.7	15.1	18.8	15.8	20	19.2 B
Zinc	8.3	10,000	33.5	6.4	53.3	25.4	82.7	10.3	12.7
Cyanide	0.18 U	41,000	0.32 UN	0.21 UN	0.19 UN	0.21 UN	0.21 UN	0.28 UN	0.29 UN
See notes at end of table.									

Table 4-6 (continued)  
Summary of Positive Detections - Inorganics

Environmental Survey  
Property Adjacent to Oceana Salvage Yard  
Naval Air Station Oceana  
Virginia Beach, VA

Sample ID	Background (SS033)	RBC for Industrial Soil (mg/kg)	SS013	SS014	SS015	SS016	SS017	SS018	SS037 (SS018DUP)	SS019
Lab ID	C6L69		C6L4L	C6L4K	C6L4J	C6L4H	C6L5T	C6L5Q	C6L5R	C6L57
Sampling Date	11/1/96		10/31/96	10/31/96	10/31/96	10/31/96	11/1/96	11/1/96	11/1/96	10/31/96
Depth, ft bis	0-0.5		0-1	0-0.5	0-0.5	0-0.5	0-0.5	0-1	0-1	0-0.5
Inorganics, mg/kg										
Aluminum	5,650	1,000,000	13,000	21,100	10,200	12,700	3,290	9,350	6,490	6,500
Antimony	0.75 UN	820	0.8 UN	0.88 BN	0.98 UN	0.94 UN	0.67 UN	7 BN	7.4 BN	3.6 BN
Arsenic	1.2 B	3.8 c/610 n	1.5 B*	3 *	2 B*	1.8 B*	5.70	5.4	9.6	3.2 *
Barium	13 B	140,000	34.1 B	51.3 B	52.8 B	59 B	27.7 B	39.9 B	34 B	37.8 B
Beryllium	0.25 U	1.3								
Cadmium	0.25 U	1,000						1.2 B	0.83 B	0.42 B
Calcium	254 BE	1,000,000	117 B*	167 B*	777 B*	577 B*	328 BE	3,020 E	1,950 E	6,290 *
Chromium	4	10,000	12.3	26.4	10.8	12.8	3.7	15.9	10.1	10.2
Cobalt	0.5 U	120,000	1.4 B	2.6 B	1.4 B	1.8 B	0.59 B	2.4 B	1.1 B	2.6 B
Copper	2.3 B	82,000	2.3 B	6.4 B	5.6 B	5.3 B	11.4	104	75.9	38.9
Iron	3,330	610,000	4,520 *	13,000 *	2,790 *	3,080 *	1,610	8,330	5,470	7,670 *
Lead	18.9 *	400	7.9 *	12.4 *	21.7 *	20.8 *	95.6 *	5,420 *	14,700 *	764 *
Magnesium	272 B	460,468	540 B	880 B	464 B	494 B	242 B	1,820	397 B	1,390
Manganese	9.2	47,000	10.1 EN*	16.5 EN*	6.80 EN*	7.5 EN*	6.7	35.2	25.8	88.2 EN*
Mercury	0.06 U	610		0.12 B	0.13 B	0.13 B		0.08 B	0.07 B	
Nickel	2 B	41,000	4.7 B	9.2 B	5.2 B	6.4 B	1.2 B	17.8	5.1 B	8.5 B
Potassium	104 B	NR	342 B	591 B	218 B	283 B	327 B	381.00 B	240 B	948 B
Selenium	0.75 U	10,000		0.88 B		1.2 B			1 B	
Silver	0.25 U	10,000								
Sodium	31.40 U	NR	61.1 B	80 B	120 B	90.7 B	147 B	236 B	38.7 B	55.9 B
Thallium	1.5 U	0								
Vanadium	7.9 B	14,000	19.4	37.6	13.5 B	16.5	6.7 B	17.9	12.1 B	25.2
Zinc	8.3	10,000	9.3	13.5	9.2	9	6.3	127	90.5	100
Cyanide	0.18 U	41,000	0.19 UN	0.2 UN	0.24 UN	0.22 UN				0.16 UN

See notes at end of table.

**Table 4-6 (continued)**  
**Summary of Positive Detections - Inorganics**

Environmental Survey  
Property Adjacent to Oceana Salvage Yard  
Naval Air Station Oceana  
Virginia Beach, VA

Sample ID	Background (SS033)	RBC for Industrial Soil (mg/kg)	SS020	SS021	SS022	SS023	SS024	SS025	SS026	SS027
Lab ID	C6L69		C6L5A	C6L53	C6L50	C6L4W	C6L4R	C6L60	C6L61	C6L62
Sampling Date	11/1/96		10/31/96	10/31/96	10/31/96	10/31/96	10/31/96	11/1/96	11/1/96	11/1/96
Depth, ft bis	0-0.5		0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	3-4	0-0.5
<b>Inorganics, mg/kg</b>										
Aluminum	5,650	1,000,000	12,500	7,270	9,640	5,590	13,100	9,780	13,100	7,230
Antimony	0.75 UN	820	2 BN	0.97 UN	1.2 UN	1.9 BN	1.1 BN	1.7 BN	0.76 UN	139 N
Arsenic	1.2 B	3.8 c/610 n	8.1 *	1.7 B*	2.7 B*	4.9 *	2.2 B*	3.3	6.4	30.7
Barium	13 B	140,000	59.1	27.7 B	45.9 B	97.3	63.5 B	36.5 B	78.8	69
Beryllium	0.25 U	1.3							0.42 B	
Cadmium	0.25 U	1,000	0.64 B	0.33 B		2.10	0.58 B			2.8
Calcium	254 BE	1,000,000	6,210 *	1,190 B*	1,460 B*	5,120 *	2,050 *	136 BE	324 BE	8,250 E
Chromium	4	10,000	20.4	7.2	9.8	18.9	16.4	9	26	12.8
Cobalt	0.5 U	120,000	2.8 B	0.8 B	1.7 B	6.00 B	2.6 B	1.3 B	5 B	2.7 B
Copper	2.3 B	82,000	41	16.3	31.1	38.1	16.1	16.2	8.5	377
Iron	3,330	610,000	9,530 *	1,820 *	3,050 *	28,000 *	7,410 *	3,790	16,800	14,300
Lead	18.9 *	400	1,989 *	18.4 *	56.1 *	194 *	202 *	116 *	13.1 *	20,400 *
Magnesium	272 B	460,468	1,190 B	406 B	636 B	1,060 B	904 B	418 B	1,420	1,110 B
Manganese	9.2	47,000	57.6 EN*	8 EN*	20.2 EN*	180 EN*	37 EN*	9.7	28.1	101
Mercury	0.06 U	610	0.08 B	0.12 B	0.14 B	0.23				0.14
Nickel	2 B	41,000	13.6	3.8 B	6.2 B	27.00	11.40 B	3.9 B	12.2	16.1
Potassium	104 B	NR	555 B	293 B	418 B	505 B	513 B	206 B	589 B	650 B
Selenium	0.75 U	10,000				1.1 B		1.5	1 B	1.1 B
Silver	0.25 U	10,000								1.1 B
Sodium	31.40 U	NR	77.1 B		99.1 B	202 B	80.9 B		46.2 B	52.3 B
Thallium	1.5 U	0								
Vanadium	7.9 B	14,000	51.7	9.1 B	13.9 B	13.7 B	22.6	11.2 B	24.2	19.9
Zinc	8.3	10,000	180	62.1	63.7	377	123	7.4	28.7	789
Cyanide	0.18 U	41,000	0.17 UN	0.24 UN	0.3 UN	0.39 BN	0.25 UN			

See notes at end of table.

Table 4-6 (continued)  
Summary of Positive Detections - Inorganics

Environmental Survey  
Property Adjacent to Oceana Salvage Yard  
Naval Air Station Oceana  
Virginia Beach, VA

Sample ID	Background (SS033)	RBC for Industrial Soil (mg/kg)	SS028	SS029	SS030	SS031	SS032	SS034
Lab ID	C6L69		C6L63	C6L65	C6L66	C6L67	C6L68	C6L6A
Sampling Date	11/1/96		11/1/96	11/1/96	11/1/96	11/1/96	11/1/96	11/1/96
Depth, ft bis	0-0.5		0-0.5	0-1	0-0.5	0-1	0-0.5	0-0.5
Inorganics, mg/kg								
Aluminum	5,650	1,000,000	12,800	11,800	28,800	8,280	10,600	7,540
Antimony	0.75 UN	820	46.8 N	0.78 UN	0.91 UN	0.71 UN	0.75 UN	4 BN
Arsenic	1.2 B	3.8 c/610 n	25.2	1.5 B	2.8 B	0.81 B	2.6	4.5
Barium	13 B	140,000	120	36.9 B	65	31.5 B	26.3 B	42.2 B
Beryllium	0.25 U	1.3						
Cadmium	0.25 U	1,000	13					0.41 B
Calcium	254 BE	1,000,000	3,540 E	376 BE	663 BE	551 BE	485 BE	3,740 E
Chromium	4	10,000	39.1	10.9	22.7	7.70	8.6	11.9
Cobalt	0.5 U	120,000	5.8 B	1 B	2.4 B	0.95 B	1.1 B	1.8 B
Copper	2.3 B	82,000	472	27.2	6.5 B	2.10 B	3.5 B	35.1
Iron	3,330	610,000	51,900	3,530	6,450	2,640	5,440	6,350
Lead	18.9 *	400	18,400 *	1,210 *	31.1 *	13.3 *	32.7 *	1,040 *
Magnesium	272 B	460,468	2,530	447 B	1,070 B	493 B	615 B	712 B
Manganese	9.2	47,000	184	6.9	11.9	11.4	11	37
Mercury	0.06 U	610	0.27	0.07 B	0.1 B			
Nickel	2 B	41,000	48.9	3.8 B	8 B	2.7 B	3.3 B	5.8 B
Potassium	104 B	NR	969 B	318 B	631 B	327 B	322 B	306 B
Selenium	0.75 U	10,000	2.5	0.93 B	1.8			
Silver	0.25 U	10,000	1.1 B					
Sodium	31.40 U	NR	114 B	44 B	348 B	214 B	264 B	230 B
Thallium	1.5 U	0	2 B					
Vanadium	7.9 B	14,000	31.1	13.4	30.4	11.3 B	17.10	14.4
Zinc	8.3	10,000	1,560	11.8	19.9	8.3	23.00	66.1
Cyanide	0.18 U	41,000						

See notes at end of table.

Table 4-6 (continued)  
Summary of Positive Detections - Inorganics

Environmental Survey  
Property Adjacent to Oceana Salvage Yard  
Naval Air Station Oceana  
Virginia Beach, VA

NOTES:

<sup>1</sup>RBC = Risk Based Concentration Table, USEPA Region III, May 1996, R.L. Smith. RBC for chromium is based on chromium VI. RBC for lead is not available, value is Interim Guidance on Establishing Soil Lead Cleanup Levels at Superfund Sites (OSWER directive 9355-4-12). For essential nutrients (calcium, magnesium) screening values were derived based on recommended daily allowances (RDAs). RBC for benzo(g,h,i)perylene and phenanthrene are not available, value is based on pyrene.

<sup>2</sup>All samples received by laboratory on 11/2/96. Refer to Figure 4-2 for sample locations.

feet bls = feet below land surface

mg/kg = milligrams per kilogram

OSWER = Office of Solid Waste and Emergency Response

USEPA = U.S. Environmental Protection Agency

B = reported value is less than contract required detection limit, but greater than instrument detection limit

DUP = duplicate sample

E = value is estimated due to matrix interference

J = associated value is estimated (below contract required quantitation limit)

N = spiked sample recovery not within control limits

U = material was analyzed for, but not detected above reported sample quantitation limit.

\* = duplicate analysis not within control limits

NR = not reported

RE = sample reextracted and reanalyzed due to matrix interference

All inorganic results expressed in milligrams per kilogram (mg/kg) soil dry weight.

Bold/shaded values indicate exceedance of regulatory guidance and background.

Blank space indicates analyte/compound was not detected at the reporting limit.

~~As used in Table 4-6~~ As used in Table 4-6 does it designate comparison value was  
OSWER 9355-4-12 vs duplicate analysis is not within control limits?  
Did you do duplicate analysis to all lead of all lead analysis?